IQ plus® 310A

Digital Weight Indicator

Version 5.0

Installation Manual

DISCONTINUED

RICE LAKE WEIGHING SYSTEMS
Industrial Solutions on a Global Scale®

ISO 9001 REGISTERED

ROCKWELL AUTOMATION ENCOMPASS™ THE AMERICAS

22979

Software Revision 5.0 — Summary of New Features

Serial Data

- Separate ticket formats allowed for the EDP port and Printer port
- Printing in upper, lower, or mixed case letters from either port
- Ticket printing from EDP port while Printer port is streaming in continuous mode
- New SYNC selection to synchronize serial streaming with the display update rate
- Toledo 8142 and 8142CK data formats are now standard
- New printer selection interfaces TM-290 and TM-295 printers in normal or inverted page mode
- New termination selection, LF, allows interfacing to printers requiring only a line feed and no carriage return at the end of a transmitted line

Keyboard Operation

- Lockouts to individually disable ZERO, TARE, UNITS, and PRINT keys
- Global lockout to disable entire keyboard

Remote Operation Through EDP Serial Port

- New EDP remote commands for all new features above
- New RESPOND parameter suppresses EDP response for higher speed operation
- New DEMAND mode for serial ports allows starting and stopping serial output with remotely-entered EDP commands
- New EDP remote commands to transmit whatever is currently on the display, and to transmit a single serial string to the EDP serial port

New Digital Filtering Settings for Faster Display Stabilization

- New threshold and sensitivity settings allow fast indicator reaction time while using heavy filtering to eliminate vibration effects

New Serial Data Format for Allen-Bradley Remote I/O Interface

- New REMOTE setting under FORMAT parameter allows data compatibility with the Allen-Bradley Remote I/O interface option

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1 INTRODUCTION

1.1 OVERVIEW OF THE IQ plus 310A

Designed to be installer-friendly, the IQ plus 310A can be configured and calibrated entirely from the front panel without entering the case. When the unit is placed into the SETUP mode by flipping the external Operate/ Setup Switch on the rear panel, the five front panel keys let you navigate around the flowchart of the system menus. A graphic "roadmap" of the menus is found in Section 3 of this manual.

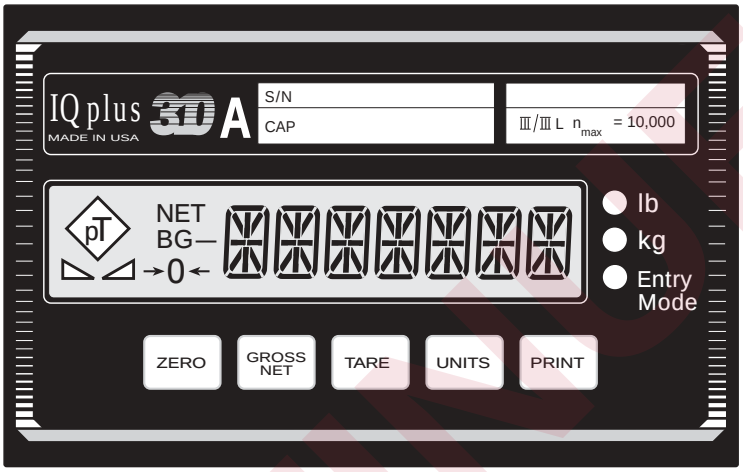

FIGURE 1 – IQPLUS 310A FRONT PANEL

Using the first of the two serial ports, a full duplex Electronic Data Processing (EDP) port, the unit can be configured, calibrated, and even operated from a remote keyboard or terminal. Coded keyboard commands for these purposes are listed in Section 6 of the manual. The other serial communications port is a simplex, output-only Printer port. The EDP port is RS232; the Printer port has RS232 and 20-mA outputs.

Both serial ports can be set to operate in continuous mode (STREAM OR DEMAND), or TICKET mode. In the STREAM or DEMAND modes, both ports can continuously transmit at rates up to 19,200 baud in any of several popular indicator formats shown in Section 6.4. In the TICKET mode, the ports can transmit a special single-ticket data string to a ticket or roll-tape printer that will customize the appearance of weight tickets .

Two digital inputs are available to allow remote operation of any of the five front panel keys, or keyboard lockout and special display functions. These digital inputs are suitable for use with dry contact switch closures or TTL logic level input.

With a choice of custom recessed panel-mounting or wall/bench mounting using a rugged tilting stand, the IQplus 310A installs quickly and solidly. Armed with a unique combination of digital filtering with programmable threshold and sensitivity, the IQplus 310A operates dependably in both high vibration areas and electrically “noisy” environments.

The indicator can drive up to six 350Ω load cells. With selectable Auto Tare or In/Out Tare functions, the installer has the flexibility to tailor the weighing operation to varying customer needs.

A "leave-behind" Operator's Instruction Card is inserted into the manual with a choice of either Auto Tare or In/Out Tare instructions.

When the installation is complete and certified, a legal seal locks the unit in OPERATE mode to prevent tampering and ensure continued accuracy.

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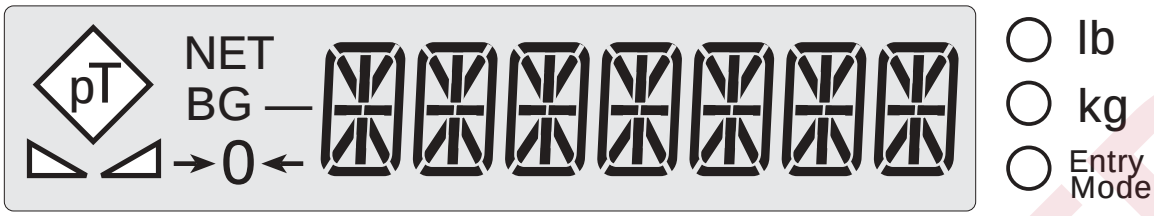
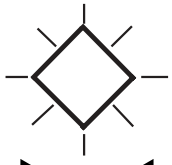
1.2 PANEL DISPLAY ANNUNCIATORS



A tare weight has been acquired and stored by the system.

A preset tare weight has been keyed in and entered via the EDP serial port.

Solid rhombus: tare weight acquired by front panel key or via digital input.



Blinking rhombus: Tare acquired or keyed in by EDP serial command.

Indicates scale is in standstill, or not in motion.

NET Indicates NET weight mode.

B or **G** Indicates Gross (Brutto) weight mode (selectable).

— Minus sign for a 7-digit number. With lesser numbers, the minus sign is formed by the middle bar of the digit to the left of the number.

→0← Indicates GROSS or NET weight is within ±.25dd of 0.

lb Pound weight unit.

kg Kilogram weight unit.

Entry Mode Indicates that the rear panel switch is in the SETUP position.

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1.3 KEYBOARD FUNCTIONS

The IQplus 310A's five front panel keys have different functions for each of the two main modes of operation (Operate and Setup). Operate and Setup modes are accessed by the switch on the rear panel. Key functions for each mode become active when the switch is set to that mode. See "OPERATE MODE" and "SETUP MODE" below.

OPERATE MODE

ZERO	GROSS NET	TARE	UNITS	PRINT
Sets scale to display "0" when in Gross mode, and within zero band range.	Toggles between Gross and Net weight display.	Performs "Auto Tare" or "Tare In/Out" functions as selected in Setup Menu.	Toggles between "lb" and "kg" units if either LB or KG units is selected in the Setup Menu.	Sends "Print" data to printer when scale is not in motion, and when 0 < Gross < full scale.

SETUP MODE

		ENTER		
ZERO	GROSS NET	TARE	UNITS	PRINT
Move UP in menu	Move DOWN in menu	ENTER Selection	Move LEFT in menu	Move RIGHT in menu

In addition, the Setup mode has a Test mode wherein the five keys have unique functions. The Test mode can only be entered when the unit is in Setup mode. See Section 3.4.

SETUP TEST MODE

ZERO	GROSS NET	TARE	UNITS	PRINT
Displays a character sequence; the EDP port continuously transmits "U".	Indicates the active Digital Input.	Displays "SERI-X", where X = a capital letter from A to X received by the EDP port.	Displays software revision.	Exits TEST menu.

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2 INSTALLATION

2.1 OVERVIEW

This section provides detailed installation procedures for the IQplus 310A hardware. The process is logical and straightforward when the steps are followed in the order given.

2.2 CHECKING THE ACCESSORY KIT

When the IQplus 310A is unpacked, an accessory kit will be found in the packing box. The kit contains the following items:

ITEM	QTY	ITEM	QTY
Capacity Strip Label (blank)	1	Screw, 1/4-20 x 1/2"	2
Weight Unit Label Set	1	Setup Switch Cover Plate (w/gasket)	1
Cable Tie	2	Hole Plug	1
Drilled Standoff	2	AC Cable	1
Berg Style Jumper	1		

2.3 REMOVING THE CASE

The unit must be removed from its case to make electrical connections and to install front panel labels. The case is secured with four cap nuts for shipping (the NEMA 4 model has 14 cap nuts). See Figure 2. Remove and save the cap nuts, then slide the unit out of the case. Use care so that the gaskets are not damaged while removing the case.

With the case removed, the cable routing paths and terminal blocks for the load cell cable and the serial communications cables can be easily located. See Figure 3.

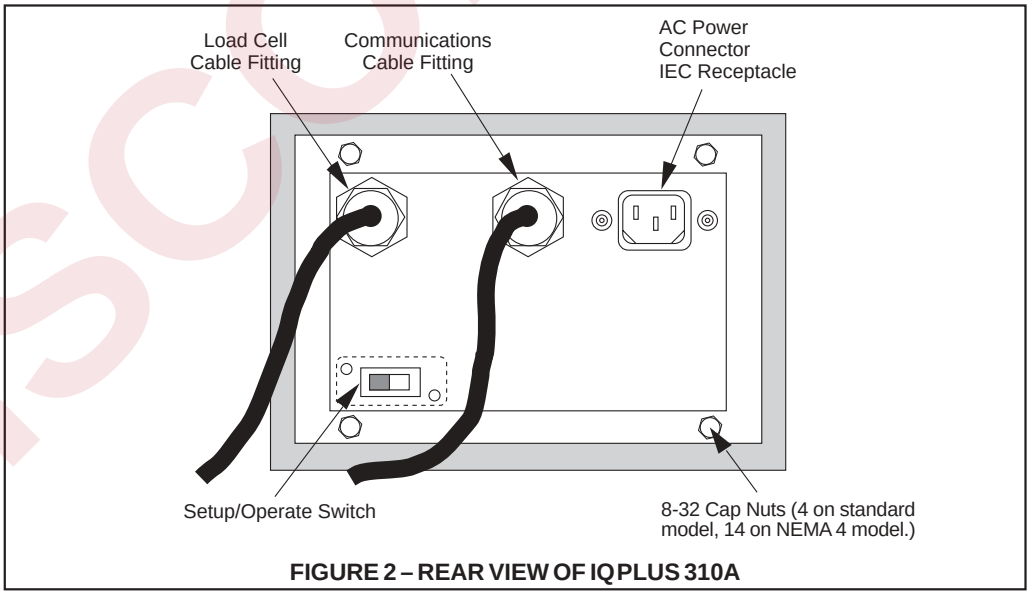

FIGURE 2 – REAR VIEW OF IQPLUS 310A

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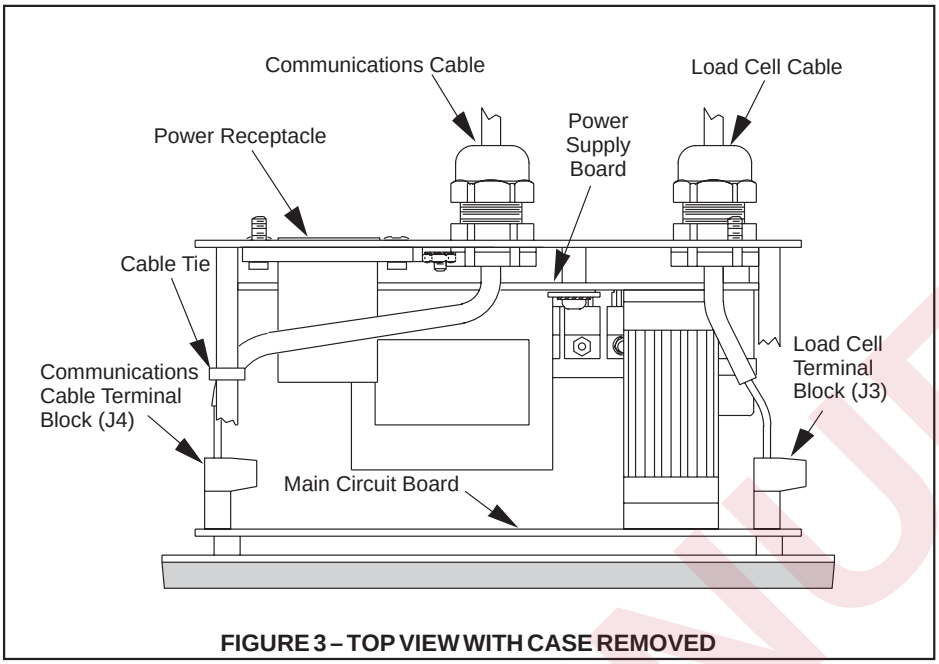

FIGURE 3 – TOP VIEW WITH CASE REMOVED

2.4 MAKING POWER CONNECTIONS

The IQplus 310A is an AC-powered unit. Note that there is no on/off power switch; the unit powers up when it is connected to the power source.

The power connector should only be mated with a three-contact connector where the third contact provides ground connection. Failure to provide a continuous ground connection to the unit may render it unsafe. To avoid damage to the unit from incorrect voltage, check the voltage rating on the rear panel label and the jumper settings (Figure 5) to be certain the settings match the local voltage. If no changes are necessary, turn to Section 2.5. If the voltage settings require a change, see below.

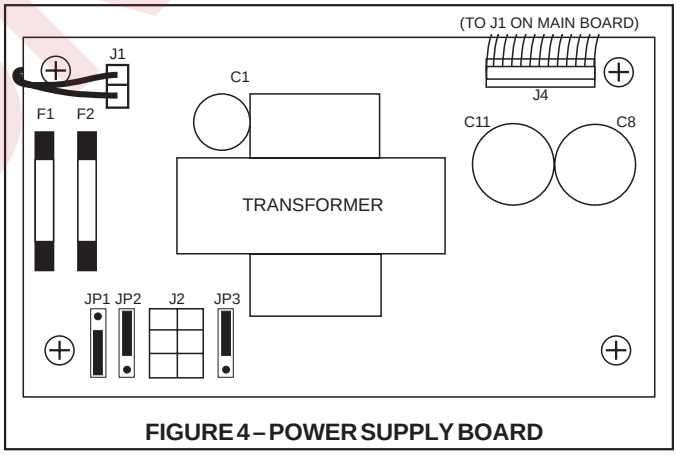

FIGURE 4 – POWER SUPPLY BOARD

The IQplus 310A can be powered by 115 or 230 VAC. The positions of jumpers JP1, JP2 and JP3 on the power supply board determine the voltage setting.

If changes are necessary:

1. Position the jumpers on the power supply board as in Figure 5 to match the local line voltage.
2. If necessary, change the dual fuses located on the power supply board. Replacement fuses are specified in Section 7.1, and are also listed on the label mounted on the main circuit board.
3. Change the line voltage and current rating on the rear panel label to reflect the new settings.

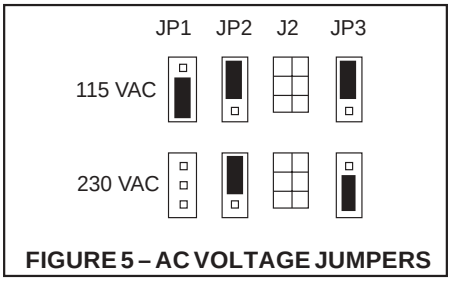

FIGURE 5 – AC VOLTAGE JUMPERS

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2.5 CONNECTING LOAD CELL CABLE

The load cell cable connects to a plug-in terminal block (J3) on the main circuit board. When shipped, the IQplus 310A is configured for 4-wire load cell connections (JP1 and JP2 on main board are jumpered). If sense leads are to be used in a 6-wire connection, remove these two jumpers. The load cell cable should be retained at its original length for correct temperature compensation. Make connections at terminal J3 according to Figure 6. Tighten the cable fitting.

J3	Load Cell
1	+ Signal
2	– Signal
3	+ Sense
4	– Sense
5	Shield (Ground)
6	+ Excitation
7	– Excitation

FIGURE 6 – LOAD CELL CONNECTIONS

2.6 CONNECTING COMMUNICATION CABLE

The serial communications cable connects to a plug-in terminal block at J4 on the main circuit board according to Figure 7. Use only one shielded cable for all signal connections, including the digital inputs if used. Remove the factory installed hole plug from the fitting and install the communications cable as follows:

(1) Loosen the cable fitting and insert the communications cable far enough to reach J4. Prepare the cable wires and shield as required. Connect them to J4 on the main circuit board. See Figure 8 for location of J4.

(2) Install a cable tie as shown in Figure 3 and tighten the cable fitting.

J4 Pin	EDP Port RS232	Printer Port RS232	Printer Port 20-mA CL
1	TxD (Transmit Data)		
2	Signal GND	Signal GND	20 mA GND
3	RxD (Receive Data)		
4			20 mA (+)
5		TxD (Transmit Data)	
6	Digital Input #2 – Functions as programmed		
7	Digital Input #1 – Functions as programmed		

FIGURE 7 – COMMUNICATIONS CONNECTIONS

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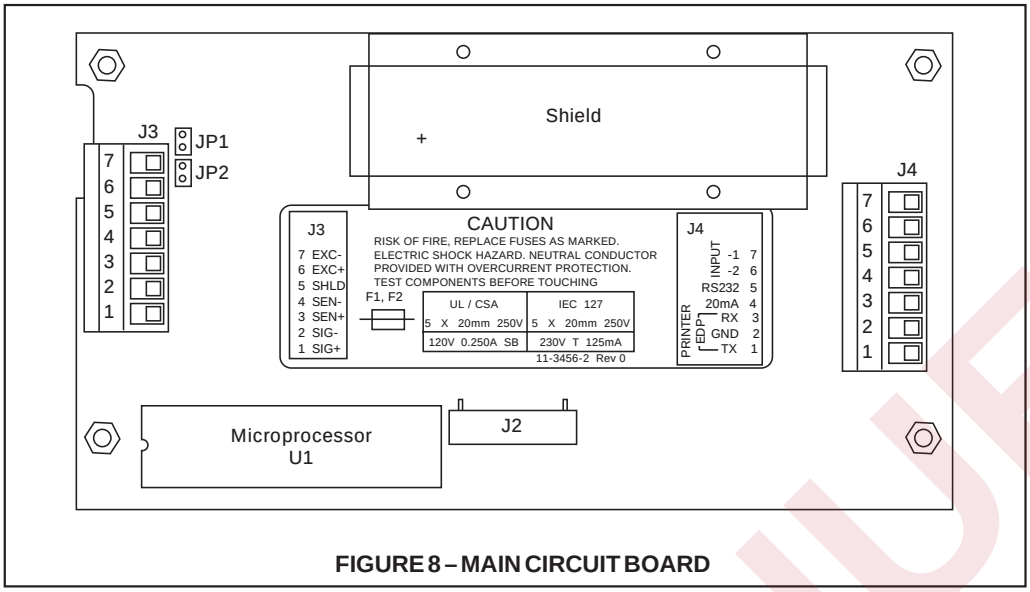

FIGURE 8 – MAIN CIRCUIT BOARD

2.7 INSTALLING LABELS

The accessory kit includes a blank capacity strip, an assortment of alternate weight unit labels, and three key labels.

2.7.1 CAPACITY STRIP

The capacity strip is a piece of flexible plastic on which the capacity and serial number of the scale are recorded. This information should be typed or written in indelible ink.

The capacity strip is loaded into a channel along the top of the front panel between the front panel bezel and the flexible switch panel. See Figure 9 on the following page. The opening of this channel is located behind the right-hand edge of the front panel bezel. When properly installed, the capacity strip can be read from the front of the indicator.

To install the capacity strip, refer to Figure 9 and follow these steps:

(1) Stand the IQplus 310A on its left side with the rear of the unit facing you.

(2) Note that the ends of the capacity strip are different. The back end is bent, forming a tab to hold when removing the strip. The front end has trimmed corners to make loading easier. Hold the capacity strip just behind the front end, (removal tab up) and the printed side facing the front of the indicator.

(3) Feed the front end of the capacity strip over the display board and into the loading slot. Note the feed angle of the capacity strip.

Caution **Do not force the capacity strip into the channel. This may crease the strip.**

(4) To start feeding the strip into the channel, wiggle the capacity strip left and right slightly while gently pushing it into the channel (see Figure 9).

(5) Gently feed the rest of the capacity strip into the channel until it stops. The removal tab should extend out of the front panel approximately 5/8 inch when the capacity strip is fully loaded.

(6) Crease the removal tab back so it does not interfere with the gasket seal.

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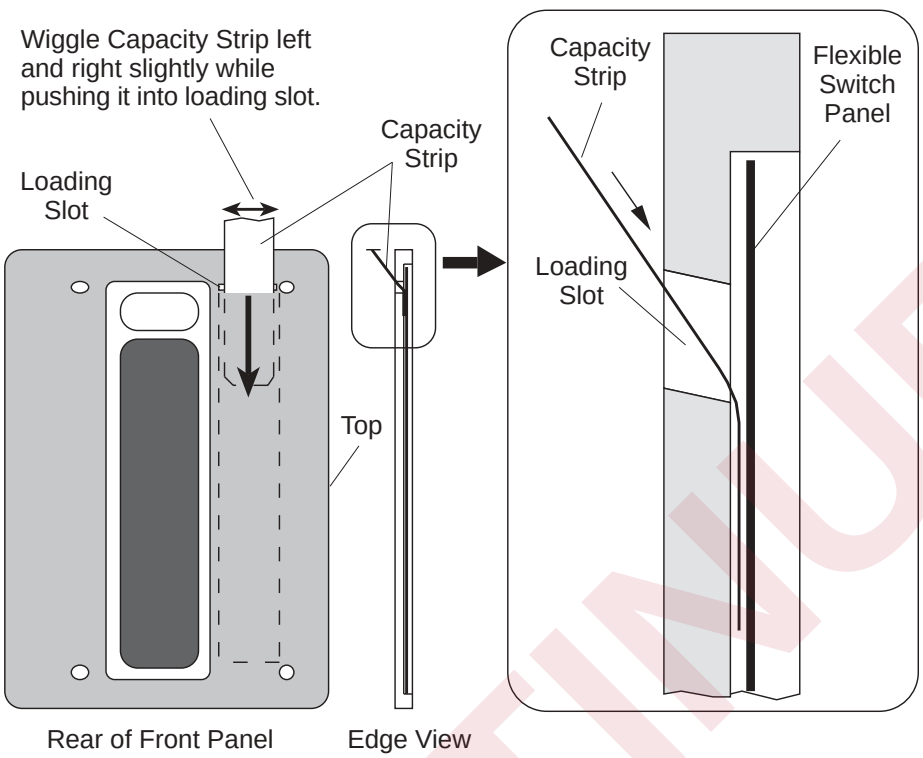

FIGURE 9 – INSTALLING CAPACITY STRIP

2.7.2 WEIGHT UNIT LABELS

The supplied weight unit labels can be applied over the existing "lb" and "kg" unit labels which are printed on the front panel. For custom units, a transparent label is provided. Print the custom label on adhesive label stock. Laminate the transparent label to the stock and trim it to size.

2.7.3 KEY LABELS

The "TEST" key label should be applied over the "UNITS" key when the international keyboard layout is selected. The black label should be applied to the "TARE" or "UNITS" key if either is locked out. The transparent label can be used for custom functions or can be laminated to a piece of black label stock to make another "blackout" key.

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2.8 REPLACING THE CASE

Before installing the case, check the following:

- All cables dressed and securely connected.
- Jumpers JP1 and JP2 installed or removed correctly for your application.
- Chassis cleaned of cut-off wires and insulation.
- Capacity strip properly installed and tabs folded away from gaskets.

Install the case as follows:

(1) Slide the case onto the unit, being careful that the capacity label does not interfere with the gasket seal.

(2) Install one drilled standoff at position 6 in Figure 10 and hex and/or cap nuts at all other positions. The standard model has 4 threaded studs; the NEMA 4 model has 14.

(3) For the standard model, tighten cap nuts and standoff slightly to compress the gaskets.

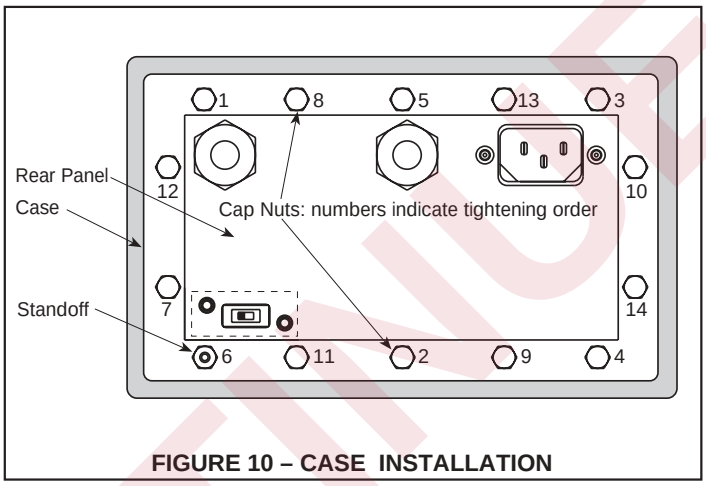

FIGURE 10 – CASE INSTALLATION

(4) For the NEMA 4 model, use the tightening sequence shown in Figure 10. Using #8-32 small pattern hex nuts on locations 1-5 and 7-14 and the drilled standoff at 6, tighten the hex nuts and standoff by small increments so the gasket compresses evenly. To assure a watertight seal, tighten the hex nuts and standoff to a final torque value of 4 lb-in. After completion of the final torque sequence, install the cap nuts on locations 1-5 and 7-14 to a torque of 4 lb-in.

2.9 MOUNTING THE INDICATOR

The IQplus 310A may be flush-mounted in a panel or wall using the Panel Mounting Accessory Kit (#19351), or mounted on a bench or wall using the Wall/Bench Mounting Accessory Kit (#19350). This section describes both methods of mounting, beginning with the panel mounting procedure.

2.9.1 PANEL MOUNTING PROCEDURE

To mount the IQplus 310A into a panel, choose the location then proceed as follows:

(1) Make a 7 3/8" W x 4 1/2" H cutout in the panel.

(2) Remove the AC cable from the unit.

(3) Remove the case of the indicator. Refer to Section 2.3.

(4) Feed the load cell and communications cables through the panel cutout and then through the rear of the case.

(5) Connect the cables to the indicator according to Sections 2.5 and 2.6.

(6) Reassemble the indicator in the case. Refer to Section 2.8.

(7) Insert the indicator into the panel from the front and temporarily hold it in place.

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(8) From the rear of the panel, attach the two panel mount brackets to the sides of the indicator as shown in Figure 11.

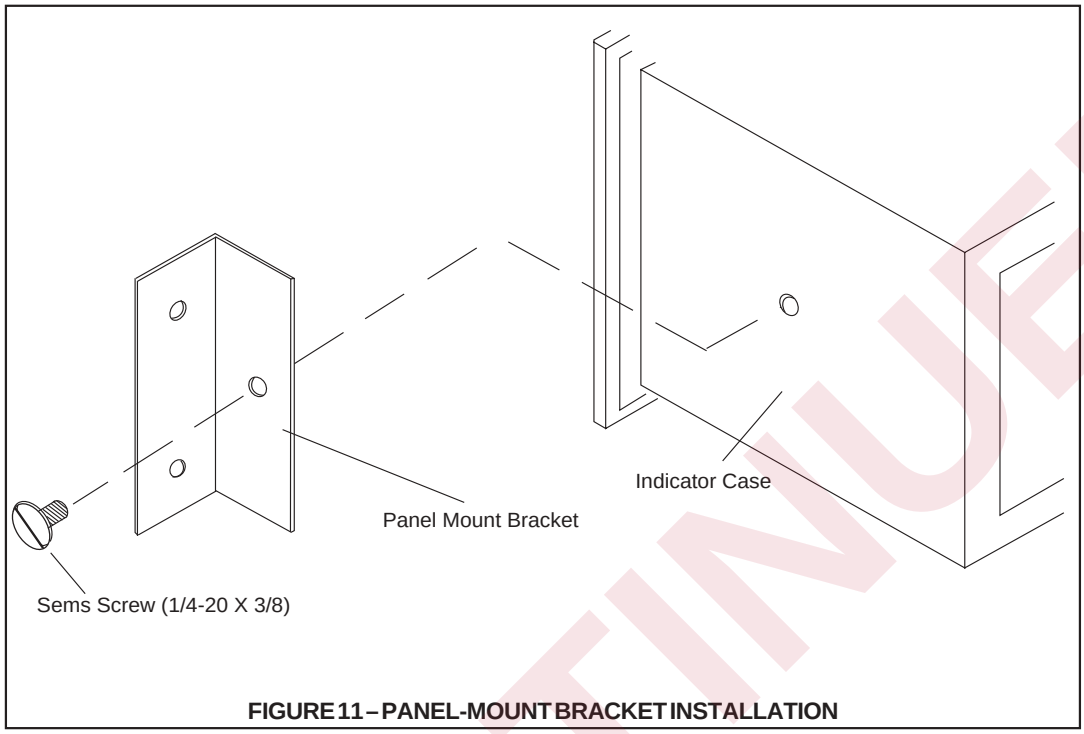

FIGURE 11 – PANEL-MOUNT BRACKET INSTALLATION

(9) Mount each bracket to the case using a 1/4-20 X 3/8" pan-head sems screw with attached washer.

(10) Thread the four 10-32 X 1 3/4" round-head machine screws into the panel mount brackets. Tighten until the indicator is secure against the panel as shown in Figure 12.

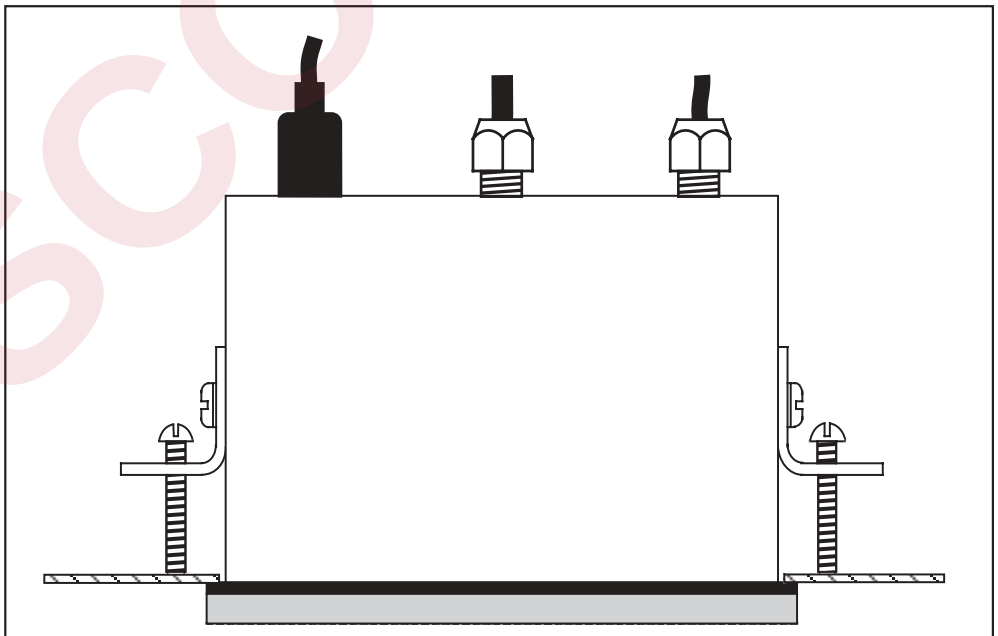

FIGURE 12 – TIGHTENING CASE TO PANEL, TOP VIEW

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2.9.2 WALL/BENCH MOUNTING PROCEDURE

(1) Mount the wall/bench mount bracket using appropriate hardware for the installation surface. Refer to Figure 13 for dimensions of the bracket and mounting holes.

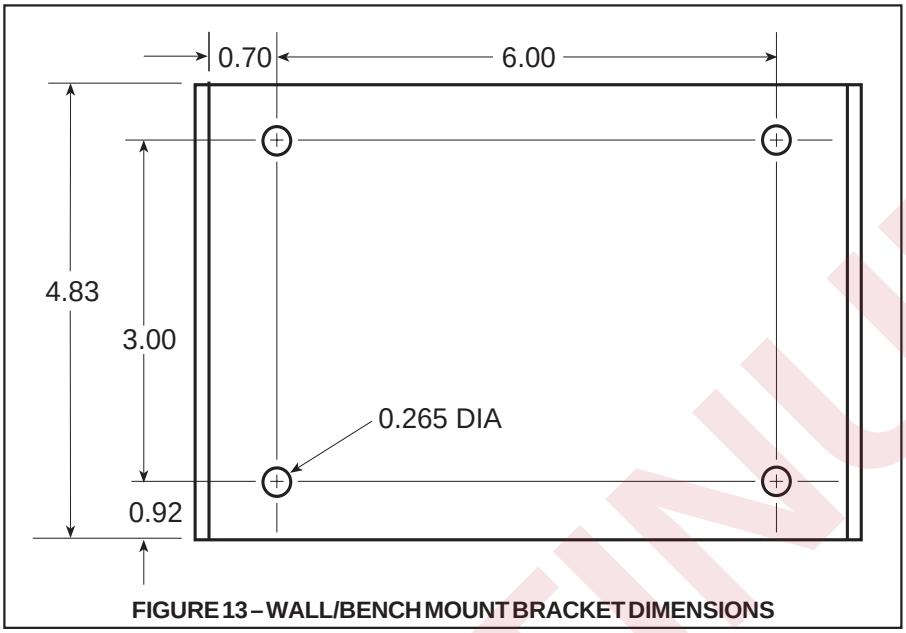

FIGURE 13 – WALL/BENCH MOUNT BRACKET DIMENSIONS

(2) Peel off the protective paper from the adhesive surface of the two round neoprene gaskets and press the sticky surface of the gaskets to the inside surfaces of the tilt stand, centered on the holes needed for the installation (see Figure 14). Bench installations can use either the upper or lower set of holes; wall installations require the upper set of holes to provide clearance distance from the wall for wiring access.

(2) Spread the tilt stand slightly to provide room to slide the indicator between the gaskets.

(4) While holding the tilt stand spread slightly, place the indicator into the stand.

(5) Place the sealing washers on the clamp knobs, with the metal side toward the knob.

(6) Insert the clamp knobs through the the holes in the tilt stand. Screw them loosely into the indicator body.

(7) Position the indicator for the desired tilt and tighten the clamp knobs securely.

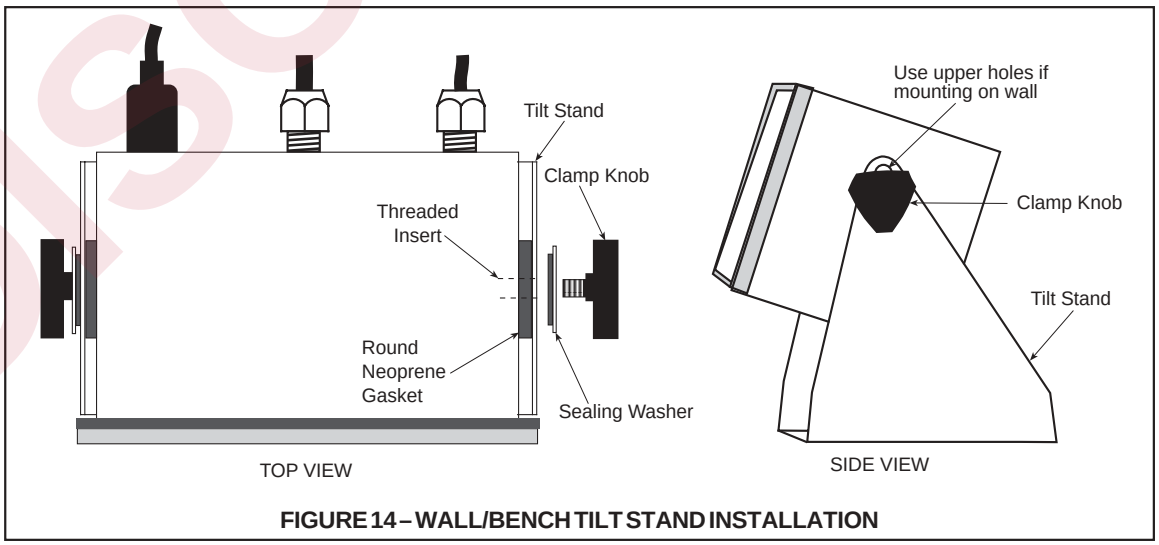

FIGURE 14 – WALL/BENCH TILT STAND INSTALLATION

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2.10 POWER-UP

There is no power on/off switch for the IQplus 310A. Power is applied immediately when the line cord is connected to the supply. The normal operation of the IQplus 310A upon power-up in the default GO mode of the PWR UP parameter is to show a display check of all front panel LED figures for five seconds, then automatically shift to the GROSS weight mode.

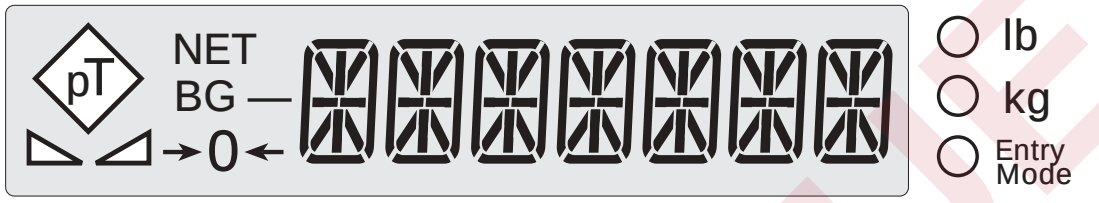

FIGURE 15 – FRONT PANEL DISPLAY CHECK DURING POWER-UP

If the PWR UP parameter is set to DELAY, the five-second display check is followed by a 60-second display of the word DELAY and a simulated clock with a moving minute hand. If no motion is detected within the 60 seconds, the display will shift to the selected mode. If motion is detected, the clock and the 60-second period begin again. If the simulated clock does not move, or if the display check does not clear in the GO mode within at least 10 seconds, it may indicate that no signal is present. Short +SIG and -SIG together to see if this clears the display. If the display clears, check signal leads to the indicator for breaks or loose connections. The Gross weight may be displayed by pressing the Gross/Net key.

In the unlikely event that process parameter data stored in memory becomes corrupted, one of the error messages listed in Section 2.11 on the following page is displayed during power up. This error code indicates that the corresponding parameter value is outside normal limits and should be corrected.

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2.11 POWER-UP DISPLAY ERROR MESSAGES

ERROR CODE	PARAMETER CORRUPTED	REMEDY
ERR P1	Decimal Point	Any of these codes displayed upon power-up indicates that a parameter value has been corrupted and is outside normal limits. The value for that parameter should be corrected using the EDP port and the appropriate EDP Set-Up Commands (See Section 6.1). After correcting the parameter value with the EDP port, send the "RS" command through the EDP port to reset the system. If the condition persists, see Section 3.4 for information on resetting all parameters back to initial settings via the Display Test Menu.
ERR P2	Display Divisions	
ERR P3	Units	
ERR P4	Digital Filter Stage 1	
ERR P5	Digital Filter Stage 2	
ERR P6	Digital Filter Stage 3	
ERR P7	Digital Filter Threshold	
ERR P8	Digital Filter Sensitivity	
ERR P9	Motion Band	
ERR P10	Zero Range	
ERR P11	Zero Track	
ERR P12	Overload Limit	
ERR P13	Power Up Mode	
ERR P14	Tare Restriction	
ERR P15	Tare Function	
ERR P16	Decimal Point Format	
ERR P17	Gross/Brutto	
ERR P18	Update Rate	
ERR P19	Keyboard Zero Lockout	
ERR P20	Keyboard Tare Lockout	
ERR P21	Keyboard Units Lockout	
ERR P22	Keyboard Print Lockout	
ERR P23	Keyboard Lockout	
ERR P24	Digital Input 1 Type	
ERR P25	Digital Input 2 Type	
ERR P26	EDP Mode	
ERR P27	EDP Baud Rate	
ERR P28	EDP Parity	
ERR P29	EDP EOL Sequence	
ERR P30	EDP EOL Delay	
ERR P31	EDP Serial Output Format	
ERR P32	EDP Alpha Case	
ERR P33	EDP Printer Type	
ERR P34	EDP Acknowlegement Disable	
ERR P35	Printer Mode	
ERR P36	Printer Baud Rate	
ERR P37	Printer Parity	
ERR P38	Printer EOL Sequence	
ERR P39	Printer EOL Delay	
ERR P40	Printer Serial Input Format	
ERR P41	Printer Alpha Case	
ERR P42	Printer Printer Type	
ERR P43	Printer Field #1 Type	
ERR P44	Printer Field #2 Type	
ERR P45	Printer Field #3 Type	
ERR P46	Printer Field #4 Type	

DISCONTINUED

3 CONFIGURATION

3.1 OVERVIEW

The parameters which can be configured in the SETUP menu are described in detail in Section 3.3. They are shown in graphic form in Figure 17 as they actually appear on the display. This unit may be configured in the usual manner through the front panel keys, or via the EDP port with coded commands shown in Section 3.3 . With a few exceptions, parameters may only be changed when the unit is in the SETUP mode. The SETUP mode is accessed by the Operate/Setup Switch on the rear of the unit (Figure 16).

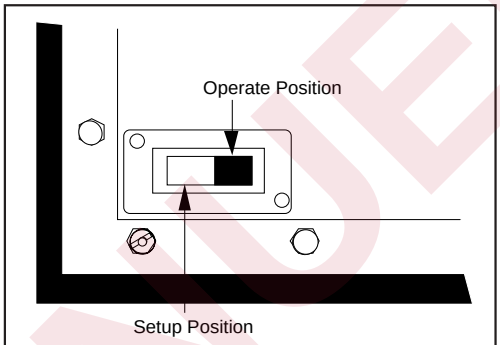

FIGURE 16 – OPERATE/SETUP SWITCH

Once the unit is in the SETUP mode, all process parameters can be configured with the front panel keys. The five front panel keys have different functions in the SETUP mode (shown in Section 3.2 below) to allow navigating around within the various menus.

The first four parameters in the table on page 16, GRADS, DEC PNT, DSP DIV, and UNITS define the scale capacity. For example, if GRADS = 10000, DSP DIV = 5, DEC PNT = 88888.88, and UNIT = lb, then the capacity is 500.00 lb in .05 lb increments.

3.2 OPERATING WITHIN THE SYSTEM MENUS

The system menu structure is shown in Figure 17. Note that there are three menu levels : Menu Heading level, Parameter Name level and Parameter Selection level. The left and right arrow keys move you horizontally across the diagram and change the Menu Heading, Parameter Name or Parameter Selection. Likewise, the up and down keys move you vertically within the diagram from one level to another.

Use the four arrow keys to move through the menus and select the desired parameter and value. Press the TARE (Enter) key to enter the value. Pressing TARE also advances the display to the next parameter to be set. Pressing the UP or DOWN key also selects or enters the parameter.

For parameters requiring a numerical entry (indicated by "XX....."), use the left/right arrow keys to select the digit to change (the selected digit will blink). Once selected and blinking, use the up/down keys to increase or decrease the value of the digit. When the desired value is displayed, press TARE to store the entry. To leave an "XX..." value unchanged, press TARE before using the up or down keys.

DISCONTINUED

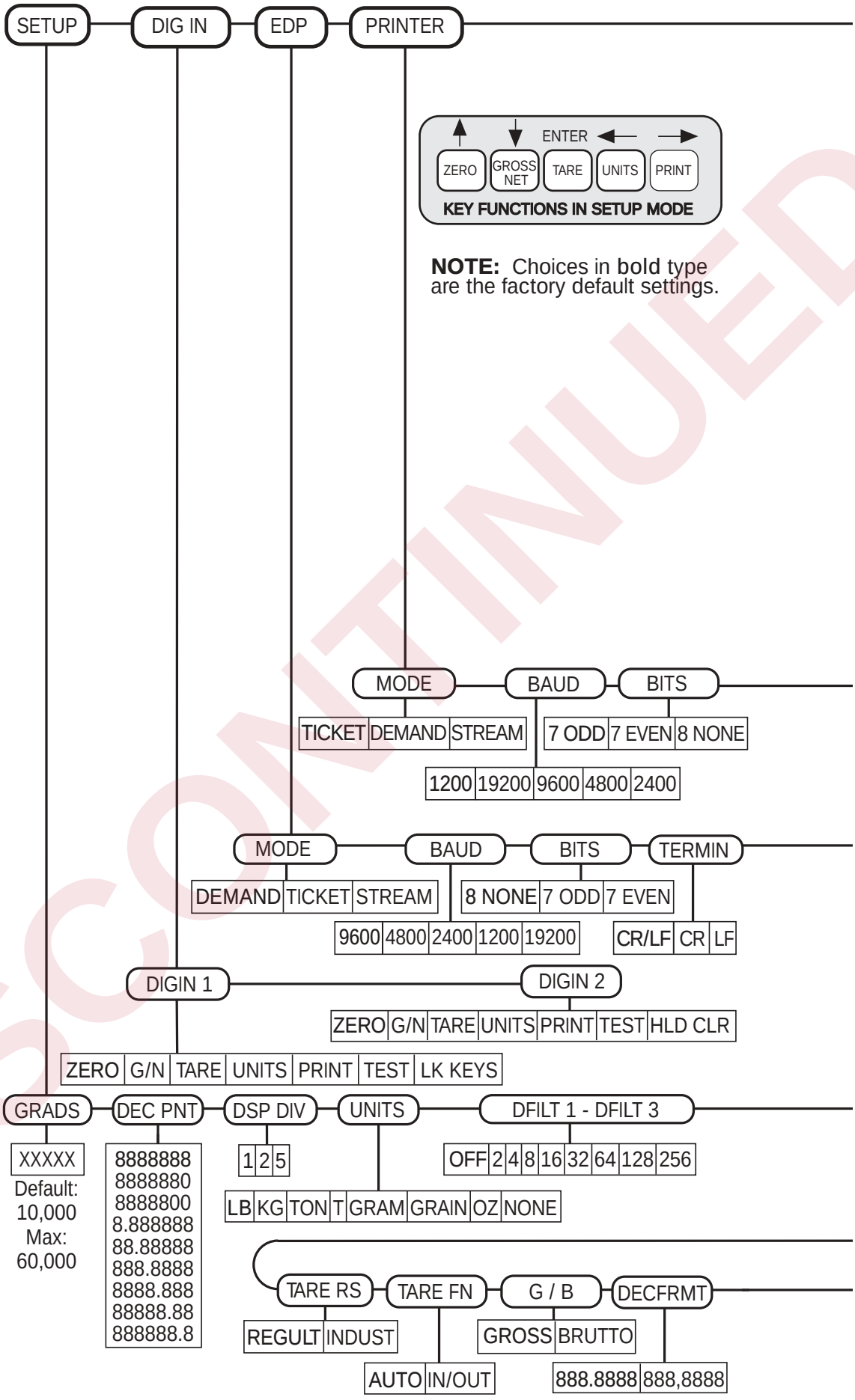

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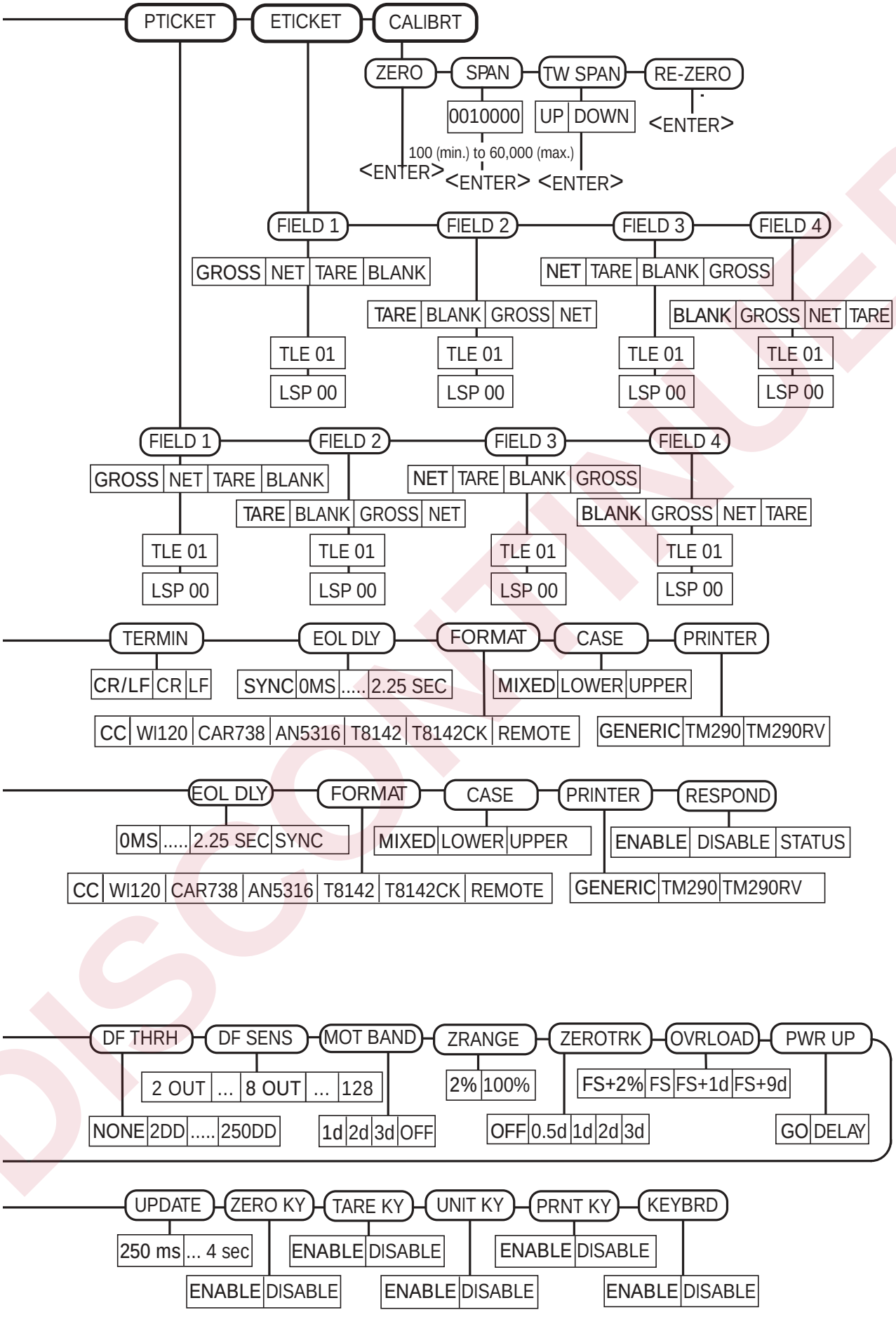
FIGURE 17 – SYSTEM MENU STRUCTURE CHART



DISCONTINUED

3.3 MENU DESCRIPTIONS

3.3.1 SETUP MENU

NOTE: Factory default settings are shown in **bold** type with a √**.** The two-letter code in parentheses beneath each parameter name is the EDP command for that parameter.

NAME/CODE	DESCRIPTION	CODE/VALUE
GRADS (GR)	Specifies number of full scale graduations. Value should be consistent with legal requirements and environmental limits on the useful system resolution.	0 to 60,000 **Default = 10,000** √
DEC PNT (DP)	Determines location of decimal point or dummy zeros. Code 6 has no decimal point. Codes 7 and 8 have no decimal point and one and two dummy zeros respectively. Value should be consistent with legal requirements. This number may be modified automatically by the indicator when the UNITS key (or equivalent EDP command) is used to display alternate units.	0 = 8.888888 1 = 88.88888 2 = 888.8888 3 = 8888.888 4 = 88888.88 5 = 888888.8 **6 = 8888888** √ 7 = 8888880 8 = 8888800
DSP DIV (DD)	Specifies display division size—the number that GRADS are multiplied by to give the displayed weight. This number is equal to the full scale capacity divided by the number of full scale graduations. This number may be modified automatically by the indicator when the UNITS key (or equivalent EDP command) is used to display alternate units.	**0 = 1** √ 1 = 2 2 = 5
UNITS (UN)	Specifies the units for displayed and printed weight.	**0=LB** √ 4=GRAM 1=KG 5=GRAIN 2=TON 6=OZ 3=T* 7=NONE * (metric)
DFILT1 (F1) DFILT2 (F2) DFILT3 (F3)	Sets each of the three digital filter stages to a value representing the number of A/D readings over which an average is calculated. Setting DFILT1 automatically sets DFILT2 and DFILT3 to the same value unless DFILT2 and DFILT3 are then changed independently to achieve intermediate values. The lowest value (OFF-OFF-OFF) provides the quickest response. The higher the number, the heavier the digital filtering and slower the response time. Filtering values may be modified via EDP commands in either SETUP or OPERATING modes. See Section 7.2 for more complete information on setting digital filtering. F1 F2 F3 OFF OFF OFF No Filtering 2 2 2 4 4 4 8 8 8 16 16 16 32 32 32 64 64 64 128 128 128 256 256 256 Heaviest Filtering	**0 = OFF** √ 1 = 2 2 = 4 3 = 8 4 = 16 5 = 32 6 = 64 7 = 128 8 = 256
DF THRH (FL)	Filter cutout threshold. Selects the threshold, in display divisions, beyond which the digital filtering will cut out. If a specified number (see DF SENS) of consecutive readings are outside the specified threshold around the currently displayed value, the indicator will jump immediately to the most recent value, ignoring filtering. "NONE" disables threshold checking.	**0 = NONE** √ 1 = 2 DD 2 = 5 DD 3 = 10 DD 4 = 20 DD 5 = 50 DD 6 = 100 DD 7 = 200 DD 8 = 250 DD

Continued

DISCONTINUED

3.3.1 SETUP MENU (CONTINUED)

NAME/CODE	DESCRIPTION	CODE/VALUE
DF SENS (FS)	Filter cutout sensitivity. Selects the number of consecutive readings that must fall outside the threshold (see DF THRH) before digital filtering is ignored and the indicator jumps directly to the new value.	0 = 2 OUT 1 = 4 OUT **2 = 8 OUT** √ 3 = 16 OUT 4 = 32 OUT 5 = 64 OUT 6 =128 OUT
MOT BAND (MB)	Selects the motion band, the level at which motion is detected by comparing the present weight reading with the previous one. If motion is not detected for one second or more, the standstill annunciator lights. When "OFF," is selected, conditions for Standstill are always met, but the annunciator does not light. Maximum value varies depending on local regulations.	0 = OFF **1 = 1dd** √ 2 = 2dd 3 = 3dd
ZRANGE (ZR)	Zero Range: Selects the range within which the scale may be zeroed. The 2% selection is ±2% around the calibrated zero point, for a total range of 4%. Indicator must be in standstill to ZERO the scale. Use 2% for legal-for-trade scales.	**0 = 2%** √ 1 = 100%
ZEROTRK (ZT)	Zero Track Band: Automatically zeroes range of selected value, as long as the input is within ZRANGE, and scale is in standstill. Selections are ±dd. Maximum value varies with local regulations.	**0 = OFF** √ 3 = 2dd 1 = .5dd 4 = 3dd 2 = 1dd
OVRLOAD (OV)	Overload: Determines the point at which the display blanks and an error message is displayed, indicating an out-of-range condition. For Legal-For-Trade scales, the setting is determined by local regulations.	0 = Full Scale 1 = FS + 1dd 2 = FS + 9dd **3 = FS + 2%** √
PWR UP (PU)	Power Up Mode: In the GO mode, the scale goes into operation immediately after the power up test sequence. In the DELAY mode, the word "DELAY" and a simulated clock appear for 60 seconds. If motion is detected during the delay period, the sequence restarts. On power up, the display is always in GROSS mode. The delay is required by HB-44 if the scale is not capable of achieving legal accuracy within warm-up.	**0 = GO** √ 1 = DELAY
TARE RS (TR)	Tare Restriction: "Regulated" requires that the scale be in standstill and the gross weight be in the range between 1 grad and full scale to acquire tare. "Industrial" allows any displayable gross weight to be acquired as a tare. There is no restriction for entering a tare value by EDP command.	0 = INDUST **1 = REGULT** √
TARE FN (TF)	Tare Function: An entered tare remains in memory in the system for subsequent weighings. "Auto" mode allows additional weight to be "tared off" by pressing the TARE key again in either G or N mode. Removing a tare value in "Auto" mode requires pressing the TARE key when the scale reads "0" in Gross Weight. With "In/Out" mode, the tare value is removed by pressing the TARE key a second time with the scale in either G or N.	**0 = AUTO** √ 1 = IN/OUT
G/B (GB)	Selects "G" (Gross) or "B" (Brutto) as the annunciator for the Gross Weight. This affects both the displayed and printed weights.	**0 = GROSS** √ 1 = BRUTTO
DECFRMT (DF)	Decimal point format. Allows specification of a comma instead of the default period to be used as a decimal point.	**0 = 8888.888** √ 1 = 8888,888

Continued

DISCONTINUED

3.3.1 SETUP MENU (CONTINUED)

NAME/CODE	DESCRIPTION	CODE/VALUE
UPDATE (UR)	Display Update Rate: Selects the time between display updates. The motion detector can be made more sensitive to small changes by increasing the update time, according to the operator's preference.	**0 = 250ms**√ 5 = 2 sec 1 = 500ms 6 = 2.5sec 2 = 750ms 7 = 3 sec 3 = 1 sec 8 = 4 sec 4 = 1.5 sec
ZERO KY (LZ)	ENABLE or DISABLE the Zero key. The LZ1 or LZ0 EDP commands will be accepted at any time. However, different locks are set or reset depending on whether the indicator is in SETUP or OPERATE mode. If either lock is on, the key is disabled.	**0 = ENABLE** √ 1 = DISABLE
TARE KY (LT)	ENABLE or DISABLE the Tare key. The LT1 or LT0 EDP commands will be accepted at any time. However, different locks are set or reset depending on whether the indicator is in SETUP or OPERATE mode. If either lock is on, the key is disabled.	**0 = ENABLE** √ 1 = DISABLE
UNIT KY (LU)	ENABLE or DISABLE the Units key. The LU1 or LU0 EDP commands will be accepted at any time. However, different locks are set or reset depending on whether the indicator is in SETUP or OPERATE mode. If either lock is on, the key is disabled.	**0 = ENABLE** √ 1 = DISABLE
PRNT KY (LP)	ENABLE or DISABLE the Print key. The LP1 or LP0 EDP commands will be accepted at any time. However, different locks are set or reset depending on whether the indicator is in SETUP or OPERATE mode. If either lock is on, the key is disabled.	**0 = ENABLE** √ 1 = DISABLE
KEYBRD (LK)	ENABLE or DISABLE all front panel keys. The LK1 or LK0 EDP commands will be accepted at any time. However, different locks are set or reset depending on whether the indicator is in SETUP or OPERATE mode. If either lock is on, the front panel keys are disabled (while in OPERATE mode).	**0 = ENABLE** √ 1 = DISABLE

3.3.2 DIGITAL INPUT MENU

Up to two external switches can be wired into the digital input connections on the J4 terminal of the main board (See Figure 8). Each switch can be programmed to duplicate the normal functions of any front panel key. For instance, a switch could remotely "press" the PRINT key through a digital input channel. The switches could also be programmed to perform Lock Keyboard or Hold/Clear functions. The KEY LK (Keyboard Lockout) selection locks out the key functions in the normal operation mode. These are the Zero, Gross/Net, etc., key functions. It does not lock the keys in the Setup Mode. The HLD CLR (Hold/Clear) selection for Input 2 holds the display and clears the running average filter. The Print function and EDP commands XG, XN and XT process the Hold values. The continuous serial output continues, sending the weight and status information captured when the Hold/Clear function was initiated.

NAME/CODE	DESCRIPTION	CODE/SELECTION
DIGIN 1 (IA) DIGIN 2 (IB)	Duplicates function of ZERO key Duplicates function of GROSS/NET key Duplicates function of TARE key Duplicates function of UNITS key Duplicates function of PRINT key Duplicates function of TEST key Locks out keyboard (IA only) Holds display and clears running average filter (IB only)	**0 = ZERO**√ 1 = GROSS/NET 2 = TARE 3 = UNITS 4 = PRINT 5 = TEST 6 = LOCK KEYBD (IA) 6 = HOLD/CLEAR (IB)

DISCONTINUED

3.3.3 EDP (ELECTRONIC DATA PROCESSING PORT) MENU

NAME/CODE	DESCRIPTION	CODE/SELECTION
MODE (EM)	Selects the transmission mode of the EDP port. In DEMAND the port is quiet on power-up, but continuous data can be started and stopped with the SX and EX commands. In TICKET, the port transmits data as formatted in the ETICKET Menu. In STREAM, the port transmits the selected data format continuously, starting automatically on power-up.	0 = STREAM **1 = DEMAND** √ 2 = TICKET
BAUD (EB)	Selects the transmission speed.	**0 = 9600** √ 3 = 1200 1 = 4800 4 = 19200 2 = 2400
BITS (EP)	Selects the number of data bits and parity of transmitted data.	**0 = 8 NONE** √ 1 = 7 ODD 2 = 7 EVEN
TERMIN (EE)	End of Line termination characters: carriage return only, line feed only, or both carriage return and line feed options. The specified characters will be appended to each streamed serial output line for CC, WI120, AN5316, and REMOTE formats (not CAR738, T8142, or T8142CK formats). These characters will also be sent for each trailing line end specified for the lines of a ticket if the printer type selected is GENERIC (not TM290 or TM290RV).	**0 = <CR> <LF>** √ 1 = <CR> 2 = <LF>
EOL DLY (ED)	End of Line delay. The delay period in milliseconds from when a line is terminated to the beginning of the next formatted printer output. Both the PRINT button and the EDP Print command (PR) are disabled during this delay period. This sets the EDP port update rate. "SYNC" synchronizes streamed serial output to the display update. If the port is in ticket mode, the end of line delay for each line will be equal to the display update interval. (The display is not changed while a ticket is being printed)	**0=0ms** √ 7=1750 ms 1=250 ms 8=2000 ms 2=500 ms 9=2250 ms 3=750 ms A=SYNC 4=1000 ms 5=1250 ms 6=1500 ms
FORMAT (EF)	Serial string format of continuous EDP port transmission. See Section 6.4 for exact data formats available.	**0 = CC** √ 1 = WI120 2 = CAR 738 3 = AN 5316 4 = T8142 5 = T8142CK 6 = REMOTE
CASE (EA)	Allows alphabetic output to the EDP port to be forced to either all upper case or all lower case.	**0 = MIXED** √ 1 = LOWER 2 = UPPER
PRINTER (EK)	Indicates the type of ticket printer (if any) connected to the EDP port. The setting of this parameter only has meaning if the EDP port is in TICKET mode. TM290 and TM290RV are used to select the TM290II ticket printer operating in normal or reverse mode.	**0 = GENERIC** √ 1 = TM290 2 = TM290RV
RESPOND (ER)	Allows disabling of the EDP port acknowlegment ("Ok" or "??") transmissions (see also the "NK" operating command in Section 6.3).	**0 = ENABLE** √ 1 = DISABLE 2 = STATUS

DISCONTINUED

3.3.4 PRINTER MENU DESCRIPTIONS

NAME/CODE	DESCRIPTION	CODE/SELECTION
MODE (PM)	Selects the transmission mode of the printer port. In TICKET mode, the port transmits data as formatted in the PTICKET Menu. In STREAM, the port transmits the selected data format continuously, starting automatically on power-up. In DEMAND mode, no output is done to the printer port. Serial output can be started and stopped using the EDP commands PX and PQ.	0 = STREAM **1 = TICKET** √ 2 = DEMAND
BAUD (PB)	Selects the transmission speed.	0 = 9600 **3 = 1200** √ 1 = 4800 4 = 19200 2 = 2400
BITS (PP)	Selects the data bits and parity of transmitted data.	0 = 8 NONE **1 = 7 ODD** √ 2 = 7 EVEN
TERMIN (PE)	End of Line termination characters: carriage return only, line feed only, or both carriage return and line feed options. The specified characters will be appended to each streamed serial output for CC, WI120, AN5316, and REMOTE formats, but not for CAR738, T8142, or T8142CK formats. These characters will also be sent for each trailing line end specified for the lines of a ticket for the GENERIC printer.	**0 = <CR> <LF>** √ 1 = <CR> 2 = <LF>
EOL DLY (PD)	End of Line delay: the delay period in milliseconds from when a line is terminated to the beginning of the next formatted printer output. Both the PRINT button and the EDP Print command (PR) are disabled during this delay period. This delay sets the printer port update rate. SYNC synchronizes streamed serial output to the display rate. If the port is in ticket mode, the end of line delay for each line will be equal to the display update interval (the display is not changed while a ticket is being printed.	**A=SYNC** √ 4=1000ms 0=0 ms 5=1250 ms 1=250ms 6=1500 ms 2=500ms 7=1750 ms 3=750ms 8=2000 ms 9=2250 ms
FORMAT (PF)	Serial string format of continuous printer port transmission. See section 6.4 for exact data format.	**0 = CC** √ 1 = WI120 2 = CAR738 3 = AN5316 4 = T8142 5 = T8142CK 6 = REMOTE
CASE (PA)	Allows alphabetic output to the printer port to be forced to either all upper case or all lower case.	**0 = MIXED** √ 1 = LOWER 2 = UPPER
PRINTER (PK)	Indicates the type of ticket printer (if any) connected to the printer port. The setting of this parameter only has meaning if the printer port is in TICKET mode. TM290 and TM290RV are used to select the TM290II ticket printer operating in normal or reverse mode. These settings automatically release the paper after printing.	**0 = GENERIC** √ 1 = TM290 2 = TM290RV

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3.3.5 PTICKET AND ETICKET FORMAT MENU

Two separate menus allow specification of the format of weight tickets—PTICKET for tickets sent to the printer port, and ETICKET for tickets transmitted via the EDP port. The line end characters to be sent are specified using the TERMIN parameters in each menu.

The ticket format parameters in the table following determine the format of up to four fields of data printed on a weight ticket. Each field may contain the Gross, Tare or Net value, be blank or display the current value (gross or net). Each field is located horizontally by entering a number of leading spaces (LSP) and vertically by entering a number of trailing line ends (TLE). The trailing line ends in the last field may also be used to advance the printer to the next ticket as shown in Figure 18.

NAME/CODE	DESCRIPTION	CODE/SELECTION
FIELD 1, 2, 3 or 4 (PT<f><x>) or (ET<f><x>) (f = field #) (x = code)	Specifies information printed in each field. **Default Settings:** **Field 1 = GROSS, Field 2 = TARE, Field 3 = NET, Field 4 = BLANK** Example: To change Field 3 to Tare, enter TARE code (3) for parameter FIELD 3 (or send EDP command PT33<CR>).	0 = BLANK 1 = GROSS 2 = NET 3 = TARE 4 = DISPLAY (DISPLAY Selects the displayed value, whether gross or net).
TLExx (PC<f><xx>) or (EC<f><x>) (f = field #) (xx = code)	Trailing Line Ends: Number of line end sequences (TERMIN) sent following the selected field. Specific number (xx) must be entered via keyboard (see Section 3.2). Example: To specify 3 carriage returns for Field 1, enter 3 for parameter TLE (or send EDP command PC13<CR>).	xx = 0 to 99 **Default = 1** √
LSPxx (PS<f><xx>) or (ES<f><x>) (f = field #) (xx = code)	Leading Spaces: Number of leading spaces preceding the selected field. Specific number (xx) must be entered via keyboard. Example: To specify 31 leading spaces in Field 3, enter 31 for parameter LSP under FIELD 3 (or send EDP command PS331<CR>).	xx = 0 to 99 **Default = 0** √

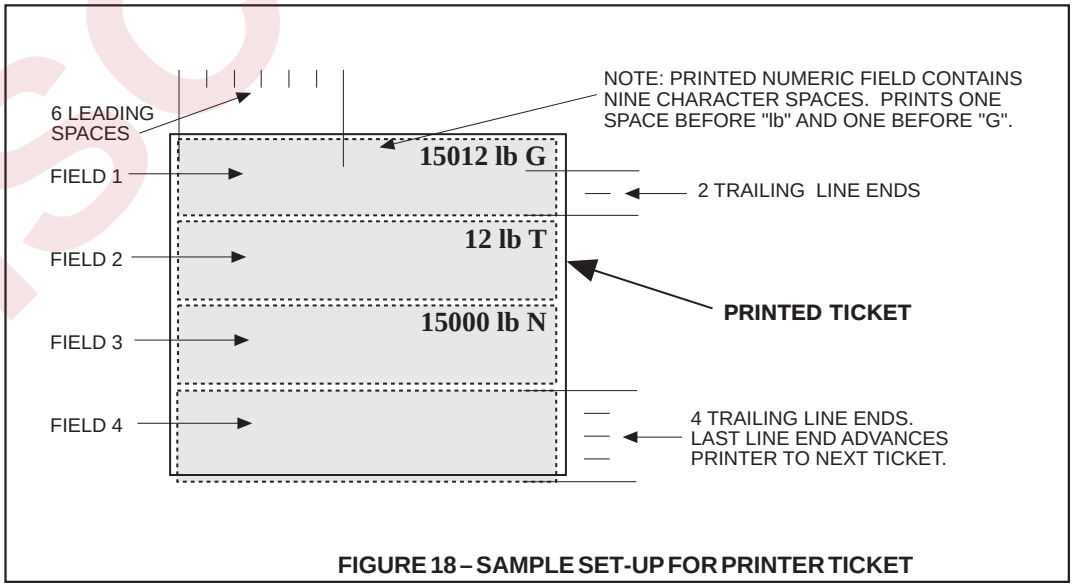

6 LEADING SPACES
NOTE: PRINTED NUMERIC FIELD CONTAINS NINE CHARACTER SPACES. PRINTS ONE SPACE BEFORE "lb" AND ONE BEFORE "G".
FIELD 1
15012 lb G
2 TRAILING LINE ENDS
FIELD 2
12 lb T
PRINTED TICKET
FIELD 3
15000 lb N
FIELD 4
4 TRAILING LINE ENDS. LAST LINE END ADVANCES PRINTER TO NEXT TICKET.

FIGURE 18 – SAMPLE SET-UP FOR PRINTER TICKET

DISCONTINUED

3.4 FUNCTIONAL TEST AND CONFIGURATION RESET

A special TEST menu allows you to perform a functional test of the Display, Keyboard, EDP port and the two digital Inputs. Figure 19 describes the function performed by each key. A configuration reset function is also a part of the test menu. The TEST menu can only be accessed when the Operate/Setup Switch is in the SETUP position.

To perform a functional test, proceed as follows:

(1) Set the Operate/Setup Switch to the SETUP mode position.

(2) Press the TARE and UNITS keys simultaneously to open the TEST menu. “TEST” is displayed.

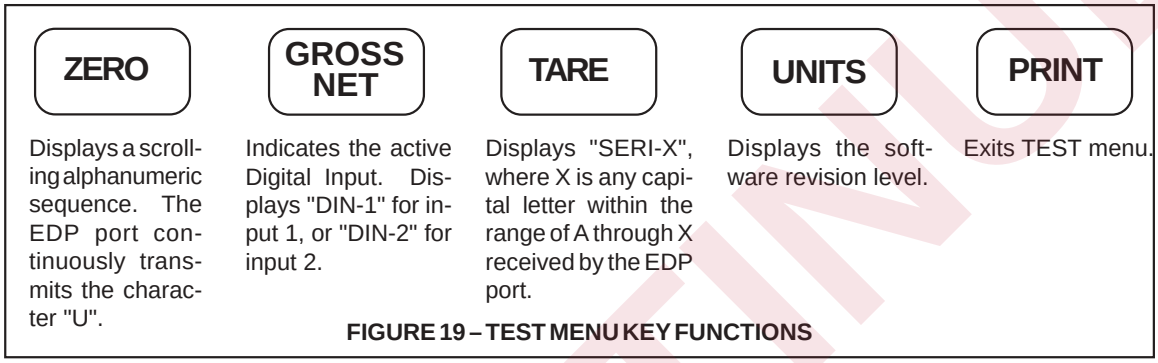

ZERO
GROSS NET
TARE
UNITS
PRINT
Displays a scrolling alphanumeric sequence. The EDP port continuously transmits the character "U".
Indicates the active Digital Input. Displays "DIN-1" for input 1, or "DIN-2" for input 2.
Displays "SERI-X", where X is any capital letter within the range of A through X received by the EDP port.
Displays the software revision level.
Exits TEST menu.

FIGURE 19 – TEST MENU KEY FUNCTIONS

Caution

With TEST displayed on the screen, simultaneously pressing the TARE and UNITS keys again replaces all data stored in the non-volatile memory with the original default parameter values. All calibration constants will also be lost. Do not reset the configuration by this method unless you intend to replace all current parameter values with the default values.

(3) Press each key and verify its corresponding function as described in Figure 19.

(4) To exit the TEST menu and return to normal operation, press the PRINT key.

To reset the parameters to their original default values, proceed as follows:

(1) Set the Operate/Setup Switch to the SETUP mode position.

(2) Press TARE and UNITS simultaneously to open the TEST menu. “TEST” is displayed.

(3) Press TARE and UNITS simultaneously again to restore the original default values.

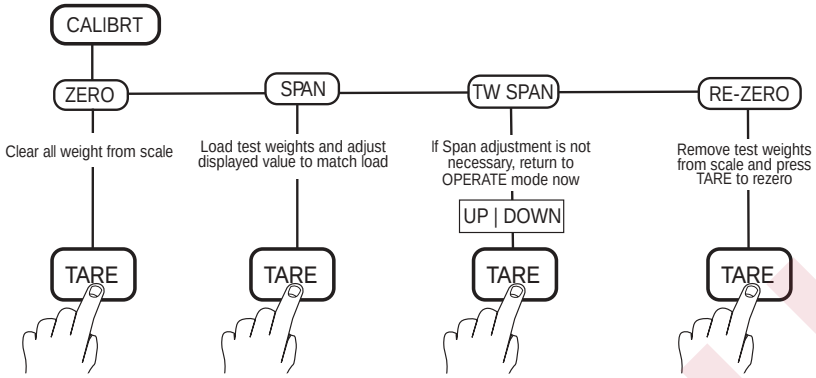
NOTE: All calibration will also be lost.

(4) Exit the TEST mode and return to normal operation by pressing the PRINT key.

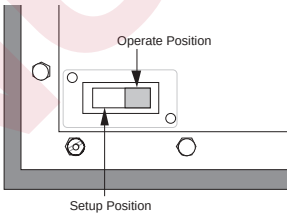
DISCONTINUED

4 CALIBRATION

4.1 CALIBRATING ZERO AND SPAN



(1) Set the Operate/Setup Switch on the rear panel to SETUP position.



(2) Press PRINT key to scroll right until CALIBRT is displayed.

(3) Using the down arrow (GROSS/NET) key, scroll down once to display ZERO. If ZERO is not displayed, scroll right until ZERO is displayed.

(4) Clear the platform of all weight. NOTE: If your calibration procedure requires hooks or chains to hang test weights on the scale, calibrate the ZERO with the chains or hooks on the scale.

(5) Press TARE (Enter). The message * CALIB* is displayed, indicating that the IQplus 310A is calibrating ZERO weight (deadload).

(6) When the ZERO calibration is finished, SPAN is displayed, indicating that the unit is ready to calibrate the SPAN (calibration) weight.

(7) Press the down arrow (GROSS/NET) key once. The number displayed will be the full scale capacity value (GRADS x DSP DIV). Place certified test weights on the scale. If the certified test weights equal full scale capacity, skip to step (9).

(8) If the test weight is less than full scale capacity, the displayed number must be adjusted to match the test weight value. This can be done using the panel keys as described in Section 3.2. Adjust the displayed number to match the test weight value. Note that if the decimal point location has been programmed in the DEC PNT parameter, the test weight value must be entered exactly as it will appear with the decimal point when weighing.

For example, when calibrating a scale for 100.00 lb x .01 lb with a 50-lb test weight, enter 50.00. If there is no decimal point, or if one or two dummy zeros have been selected in the DEC PNT parameter, enter the test weight exactly as it will be displayed. For example, when calibrating a 100,000-lb x 10-lb scale with a 50,000-lb test weight, enter 50000.

(9) Press TARE (Enter). The message * CALIB* is displayed, indicating that the SPAN is being calibrated. (If the displayed number remains and * CALIB* does not appear, it indicates that you have tried to enter a SPAN value that is outside the scale capacity as defined by the first four parameters of the SETUP menu).

DISCONTINUED

(10) After SPAN calibration is finished, TW SPAN (Tweak Span) is displayed. If an extremely fine adjustment of SPAN is not required, press PRINT and skip to step (11). If a fine adjustment is required, turn to Section 4.2 to complete the calibration procedure.

(11) RE-ZERO. This function is used mainly when the calibration procedure requires a hook or chain to hang the test weights on the scale. RE-ZERO is designed to remove the weight offset of a chain or hook from the IQ plus 310A zero band. To perform the RE-ZERO, clear the platform of all weight, including the chains or hooks used. While the indicator is prompting RE-ZERO, press TARE (Enter). The message * CALIB* appears. Do not disturb the platform until the RE-ZERO is finished.

(12) Return the Operate/Setup Switch to the OPERATE position and install the switch cover and legal seal according to directions in Section 4.3

4.2 FINE-TUNING (TWEAKING) SPAN and RE-ZERO

(1) While TW SPAN is displayed, press the down arrow (GROSS/NET) key. The number displayed next is the test weight with an extra decade of resolution. No decimal point or dummy zeros are shown.

(2) Press the up (ZERO) and down arrow (GROSS/NET) keys to make a fine adjustment to this test weight. If you press and hold either key, the value will increment by 0.1 grad intervals.

(3) Press TARE to store the result. RE-ZERO is displayed. RE-ZERO removes the offset of test weight hooks and re-centers the zero band.

(4) Remove all test weights and hooks from the scale.

(5) Press TARE. The message * CALIB* appears. Do not disturb the platform until finished.

(6) Place the Operate/Setup Switch in the OPERATE position and install the switch cover and legal seal according to directions in Section 4.3.

4.3 INSTALLING THE LEGAL-FOR-TRADE SEAL

All hardware for this procedure is supplied in the Accessory Kit.

(1) Set the Operate/Setup Switch to the OPERATE position.

(2) Remove the backing from the switch cover gasket and apply the gasket to the switch cover.

(3) Install the switch plate as shown and tighten hardware to 6 lb-in.

(4) Thread the wire for the seal through the holes in both standoffs and twist the ends of the wire together.

(5) Install the seal on the wire loop as shown in Figure 20.

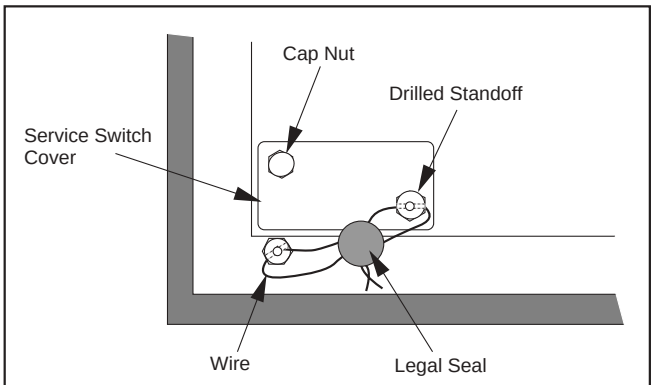


FIGURE 20 – LEGAL SEAL INSTALLED

DISCONTINUED

5 NORMAL OPERATION

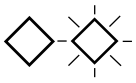
ZERO — Press to return Gross weight display to zero. Zero indicator → **0** ← will light.

GROSS NET — Press to change between Gross **G** and Net **N** weight on display.

TARE — Press to acquire tare. If tare is acquired by this method, the keyboard indicator (T) lights.
NOTE: → **0** ← also lights to indicate center of zero net.
If a tare value is entered from the EDP port, (pT) will light.

UNITS (TEST) — Press to change between weight units, pounds **lb** and kilograms **kg.** When in the Test Mode, press this key to display the software revision level.

PRINT — Press to send data to a printer or computer. This command is executed only when the scale is in a standstill condition, shown by the standstill indicator being lit.



The diamond-shaped indicator light is always on when a **T** or **pT** is lit. The diamond is solid when the tare was acquired by the **TARE** key or through Digital Input. The diamond flashes when a tare was acquired or entered from a remote keyboard through the EDP port.

5.1 AUTO TARE MODE

Once entered, a tare value remains in memory for subsequent weighings until the tare is cleared out or replaced with a new tare value. The tare can be cleared as in Step 7 below. Alternately, a new tare that replaces the existing tare, can be entered while in either **G** or **NET** mode, as in Step 3.

(1) TO ZERO SCALE: Place scale in **G** mode. Remove any weight loaded on deck and wait for . Press **ZERO.** → **0** ← will appear if scale is within Zero Range.

(2) TO ENTER A TARE: Place tare container on scale deck. Wait for , then press **TARE.** Scale changes to **N** mode, and (T) appears if tare value was acquired.

(3) TO REPLACE A TARE: Place new container on scale. In either **N** or **G,** press **TARE** to replace old tare.

(4) TO VIEW GROSS WEIGHT: With (T) acquired, load scale. Net weight is displayed. Press **GROSS NET** to shift display to **G.**

(5) TO PRINT TICKET: Press **PRINT**. If the scale is in motion, the printout is delayed until the weight is stable.

(6) TO WEIGH WITH A STORED TARE: With tare container on scale, load scale. Stored tare is automatically subtracted in **N** mode display. **G** mode display shows total weight.

(7) TO REMOVE STORED TARE: Place scale in **G** mode. Remove weight from scale and wait for . If **G** display is not 0, press **ZERO** key. Press **TARE** to remove stored tare.

NOTE: If the scale is used in the INDUSTRIAL mode, all operations requiring standstill (except printing) can be done with the either on or off.

DISCONTINUED

5.2 IN/OUT TARE MODE

Once acquired with the **TARE** key, a tare value remains in memory for subsequent weighings until the **TARE** key is pressed again which erases the existing tare. A new tare can then be entered with the **TARE** key only when the scale is in the **G** mode.

(1) TO ZERO SCALE: Place scale in **G** mode. Remove any weight loaded on deck. If T or pT is lit, remove stored tare as in Step 3. Wait for ◺◿. Press **ZERO**. → **0** ← will appear.

(2) TO ENTER A TARE: Place scale in **G** mode. Place tare container on scale deck. Wait for ◺◿, then press **TARE.** Scale changes to **N** mode, and T appears if tare value was acquired.

(3) TO REMOVE STORED TARE: Press **TARE.** T light will go off, showing the tare has been removed.

(4) TO VIEW GROSS WEIGHT: With T acquired, load scale. Net weight appears. Press GROSS NET to shift display to **G**

(5) TO PRINT TICKET: Press **PRINT**. If the scale is in motion, the printout is delayed until the weight is stable.

(6) TO WEIGH WITH A STORED TARE: With tare container on scale, load scale. Stored tare is automatically subtracted in **N** mode display. **G** mode display shows total weight.

NOTE: If the scale is used in the INDUSTRIAL mode, all operations requiring standstill (except printing) can be done with ◺◿ either on or off.

5.3 DISPLAY ERROR CODES

MESSAGE	MEANING	REMEDY
–UNCAL–	System is uncalibrated. Displayed in operate mode after initialization of the EEPROM.	Perform calibration. See Section 4.
— — — — —	Gross weight exceeds the overload limit.	Measure load cell signal (45 mV, max.). Re-span the scale. Indicates overload in normal operation.
_ _ _ _ _	A negative Gross weight exceeds the calibrated range of the A/D converter.	Measure load cell signal (–5.0mV, max.).
CAL ERR	Calibration attempted with less than one raw count per grad. Also displayed if calibration was attempted with the load cell excitation disconnected.	Measure minimum and maximum load cell signals. Re-calibrate with more active signal.
PCS ERR	Parameter Checksum error. May be caused by software incompatibility or faulty EEPROM.	Re-enter any parameter or, as a last resort, clear the EEPROM.
ACS ERR	The A/D calibration data contains an error.	Re-calibrate A/D Converter (Section 7.3).
ERR PXX	Parameter "XX" has an invalid entry. Usually caused by incompatible software.	Check and re-enter the erroneous parameter (Section 2.11). As a last resort, clear the EEPROM.
A/D ERR	A/D Converter fails read/write test.	Replace the A/D converter (Section 7.3).
EE ERR	EEPROM fails read/write test.	Replace EEPROM.

DISCONTINUED

6 EDP REMOTE COMMANDS AND SERIAL PORT OPERATION

Besides sending serial communications to remote peripheral devices, the IQ plus 310A can also process incoming serial communication commands from a remote keyboard through its EDP (Electronic Data Processing) port. Incoming commands can be used for three purposes:

- Setup and configuration
- Calibration
- Normal weighing operations

Some commands are accepted in the SETUP as well as the OPERATE mode. Commands are NOT accepted during a printing operation, or when calibration is being performed.

The EDP command format is as follows:

<COMMAND><n><CR>

Where: COMMAND = a 2-letter command (upper or lower case letters)

n = a selection code or numerical entry

CR = a carriage return

By eliminating the selection code or numerical entry, the command becomes an inquiry.

The IQ plus 310A responds with an “OK” if the command string is valid.

The IQ plus 310A responds with the value of the parameter if the command is an inquiry.

The IQ plus 310A responds with “??” If the command string is invalid, or if trying to change a setup value while in OPERATE mode.

6.1 EDP SETUP COMMANDS

The setup parameter commands use a single-digit selection code for most functions. Grads, Ticket Format, and Calibration require numerical entries. See the Setup Menu Descriptions in Section 3.3 for code identification. All Setup commands listed in the chart can only be used when the indicator is in SETUP Mode.

6.2 EDP CALIBRATION COMMANDS

The Calibration commands are valid only when the indicator is in the SETUP Mode. While calibration is in progress, the indicator displays “CALIB”. The indicator returns “OK” when calibration is completed.

COMMAND	DESCRIPTION OF FUNCTION
CD	Calibration of Deadload or Initial load (Zero)
CW	Calibration of Test Weight. If the test weight is not equal to full scale capacity, send the EDP command CW "nnnnnnn" <CR>, where nnnnnnn is the numerical value of the test weight. See Section 4.1. Serial input and keyboard commands are ignored until the calibration is completed.
CZ	Re-zero. See Section 4.2.

DISCONTINUED

6.3 EDP OPERATING COMMANDS

The following EDP 2-letter commands can be used to operate the scale. They are valid in OPERATE and SETUP modes except as noted.

COMMAND	DESCRIPTION OF FUNCTION
AZ	Sets scale to zero. Valid only in Operate Mode.
AT	Tare in. Entered as "AT nnnnnnn <EOL>" where nnnnnnn is a 7-digit tare weight, no decimal point or leading zeros. Entering "AT <EOL>" acquires the current displayed value as a tare. "pT" in a blinking rhombus indicates a tare entered through the EDP port.
FT	Performs a front panel tare operation. Entering "FT <EOL>" acquires a tare like pressing the TARE key
CT	Tare out (removes the tare value)
LB	Selects "lb" for weight units (if set up for "lb" or "kg" units mode)
KG	Selects "kg" for weight units (if set up for "lb" or "kg" units mode)
GN	Simulates a GROSS/NET key press. Entering "GN <EOL>" toggles between the gross and net display mode.
PR	Sends formatted weight data to either or both serial ports (port mode must be "TICKET"). During printer operation, EDP commands are ignored. Wait for "OK" display before sending more commands. If printing is inhibited by scale being out of range or in SETUP mode, "??" isdisplayed. If the scale is in motion, the command is executed when standstill returns. Valid only in Operate Mode.
RE	Clears the EEPROM. See the CAUTION in Section 3.4.
RS	Resets system
SX	Starts continuous serial transmission on the EDP port using the selected serial output data format. Serial transmission stops in SETUP mode.
PX	Starts continuous serial transmission on the printer port using the selected serial output data format. Serial transmission stops in SETUP mode.
EX	Ends continuous serial transmission on the EDP port
PQ	Ends continuous serial transmission on the printer port
XG	Transmits GROSS [9 characters, leading zeros suppressed (spaces), decimal point if applicable, minus sign to left of first active digit] . Valid only in Operate Mode.
XN	Transmits NET [9 characters, leading zeros suppressed (spaces), decimal point if applicable, minus sign to left of first active digit] . Valid only in Operate Mode.
XT	Transmits TARE [9 characters, leading zeros suppressed (spaces), decimal point if applicable, minus sign to left of first active digit] . Valid only in Operate Mode.
XD	Transmits the value currently displayed
XS	Transmits a single serial string from the EDP port in the selected output format
NK	Returns the number of "??" responses sent (or suppressed) since the previous NK was received. May be used if responses have been disabled to determine if a sequence of commands was successful.

DISCONTINUED

6.4 SERIAL PORT OPERATION AND DATA FORMATS

6.4.1 SERIAL PORT OPERATION NOTES.

1. Serial input/output contention

The IQplus 310A operates its serial ports in a preemptive receive mode. If the serial port starts receiving a command, any output in process to either the EDP port or the printer port is terminated immediately to avoid losing input data.

When the transmission is allowed to resume, the last character being transmitted will be terminated with stop bits and resent. This can lead to longer than expected lines being sent, but no characters will be lost (i.e. carriage returns, line feeds, <SI> or <SO>s, etc.) that might affect control operation of the receiving device.

There is a period of time while the output is being initialized that input will be ignored, and this period is longer when the output baud rate is lower. Because of this, streaming to either port at a low baud rate may cause EDP commands to be misread or not received at all.

2. Serial input overrun

If commands are sent to the IQplus 310A without checking the acknowledgment (“Ok” or “??”) returned from the indicator before sending the next command, the possibility of a command overrun exists. If this occurs, the new command will not be processed and a response of “??” will be transmitted.

3. Mixed baud rate output

If the printer and EDP ports are both streaming at significantly different baud rates, the update rate for the faster port may be significantly impacted.

6.4.2 CONTINUOUS OUTPUT SERIAL DATA FORMATS

The IQplus 310A transmits the Gross, Tare, or Net weight values on demand or streams them continuously. The format for continuous serial output data is determined by the FORMAT parameter in the EDP menu. The various data formats are described below.

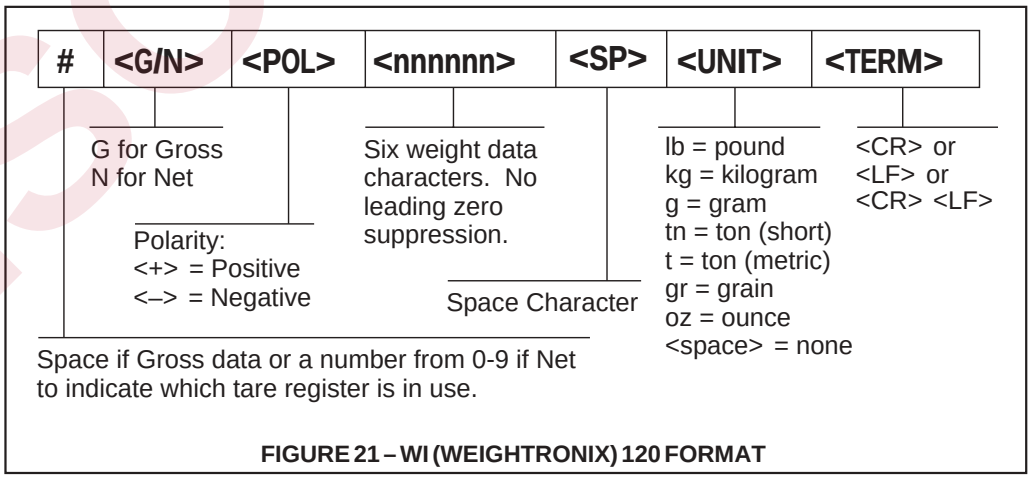


FIGURE 21 – WI (WEIGHTRONIX) 120 FORMAT

DISCONTINUED

6.4 SERIAL PORT OPERATION AND DATA FORMATS (CONTINUED)

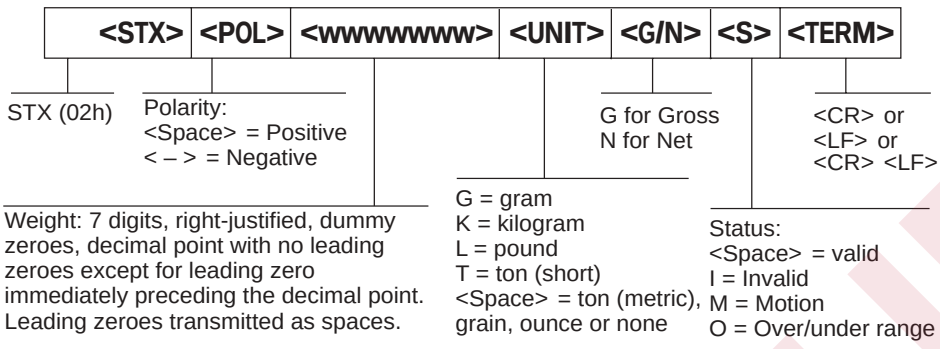


FIGURE 22 – CC (CONSOLIDATED CONTROLS) DATA FORMAT

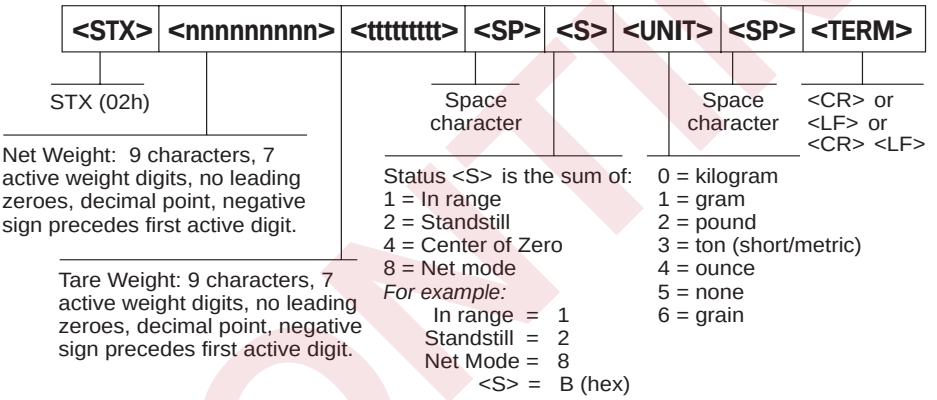


FIGURE 23 – AN (ANALOGIC) 5316 DATA FORMAT

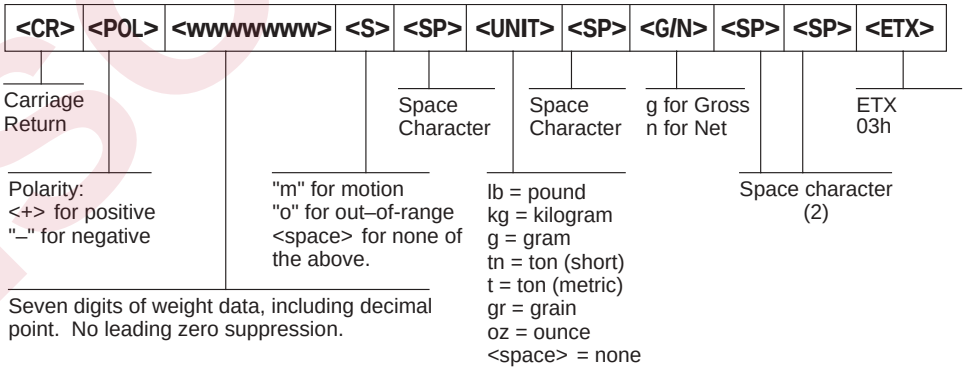


FIGURE 24 – CAR (CARDINAL) 738 FORMAT

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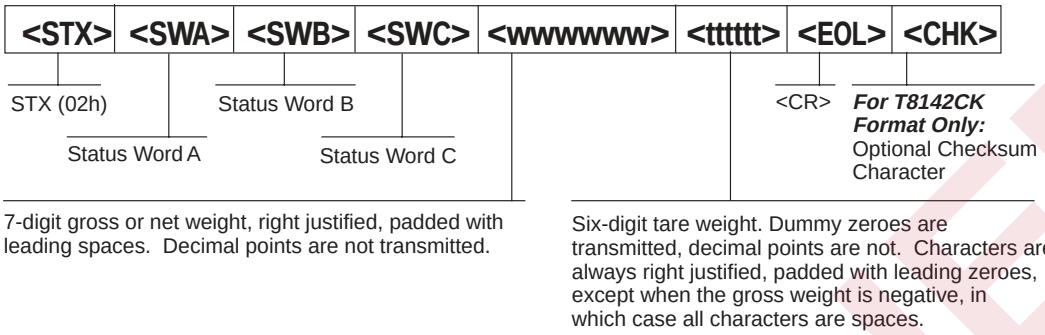
6.4 SERIAL PORT OPERATION AND DATA FORMATS (CONTINUED)



7-digit gross or net weight, right justified, padded with leading spaces. Decimal points are not transmitted.

Six-digit tare weight. Dummy zeroes are transmitted, decimal points are not. Characters are always right justified, padded with leading zeroes, except when the gross weight is negative, in which case all characters are spaces.

Status Word A:

7	6	5	4	3	2	1	0
Parity	0	1	MUL1	MUL0	DP2	DP1	DP0

Even parity bit.
Requires EDP Port setup.

See Section 3.3.3.

Disp. Div. MUL1 MUL0	Multiplier
0 1	x 1
1 0	x 2
1 1	x 5

DP2 DP1 DP0	Fixed Zero/Dec. Pt. Location
0 0 0	x 100 (2 fixed zeroes)
0 0 1	x 10 (1 fixed zero)
0 1 0	x 1 (No decimal point)
0 1 1	x 0.1 (1 decimal place)
1 0 0	x 0.01 (2 decimal places)
1 0 1	x 0.001 (3 decimal places)
1 1 0	x 0.0001 (4 decimal places)
1 1 1	x 0.00001 (5 decimal places)

Status Word B:

7	6	5	4	3	2	1	0
Parity	0	1					

Even parity bit:
Requires EDP Port setup. See Section 3.3.3.

0 = Gross Display Mode
1 = Net Display Mode

0 = Positive indicated weight value
1 = Negative indicated weight value

0 = In range
1 = Out of range

0 = lb
1 = kg

0 = Stable
1 = Motion

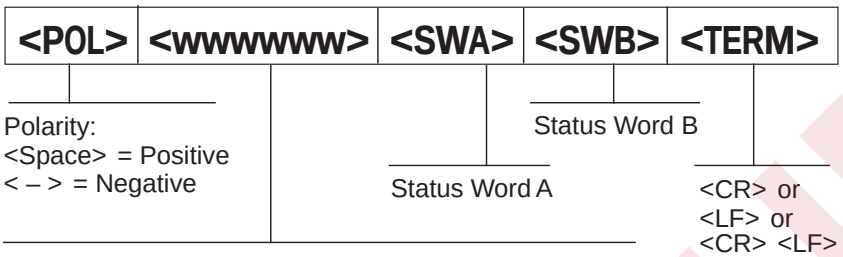
Status Word C: ASCII 20h (space)

7	6	5	4	3	2	1	0
Parity	0	1	0	0	0	0	0

Even parity bit:
Requires EDP Port setup. See Section 3.3.3.

FIGURE 25 – TOLEDO T8142 AND T8142CK FORMATS

DISCONTINUED



Polarity:
<Space> = Positive
< – > = Negative

Status Word B

Status Word A

<CR> or
<LF> or
<CR> <LF>

Weight: 7 digits, right-justified, dummy zeroes, decimal point with no leading zeroes except for leading zero immediately preceding the decimal point. Leading zeroes transmitted as spaces.

Status Word A:

7	6	5	4	3	2	1	0
Parity	1	0	0				

0 = Stable
1 = Motion

0 = No Tare
1 = Tare in System

0 = Primary Units
1 = Secondary Units

0 = GROSS Display Mode
1 = NET Display Mode

Status Word B:

7	6	5	4	3	2	1	0
Parity	1	0	0	0			

0 = Tare not EDP-entered
1 = Tare EDP-entered

0 = In Range
1 = Out of Range

0 = Not Center-of-Zero
1 = Center-of-Zero

FIGURE 26 – REMOTE FORMAT

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7 APPENDIX

7.1 SPECIFICATIONS

Analog Specifications

Full Scale Input Signal	5 to 40 mV including deadload (initial load)
Input Impedance	200 MΩ, typical
Noise (Referred to Input)	0.3 μV p-p with 4-4-4 filter, maximum
Internal Resolution	Approximately 1,000,000 counts
Display Resolution	60,000 dd
Measurement Rate	50 meas/sec, typ.
Input Sensitivity	50 nV per internal count
System Linearity	Within 0.01% of FS
Zero Stability	150 nV/° C, maximum
Span Stability	3.5 ppm/°C, maximum
Recommended Recalibration	3 years
Calibration Method	Software calibration, with long-term storage in EEPROM
Common Mode Voltage	± 4V, referred to earth
Common Mode Rejection	140 dB, minimum @50 or 60 Hz
Normal Mode Rejection	90 dB, minimum @50 or 60 Hz
Input Overload	12V
Excitation Voltage	10 ± 0.5 Vdc, 6 x 350Ω load cells
Display Filtering	Selectable digital filtering and update rate
Sense Amplifier	Differential amplifier with selectable 4 wire/6 wire sensing
RFI Protection	Signal, excitation, and sense lines protected by capacitor bypass

Digital Specifications

Microcomputer	NEC μPD75216A	
	Program Memory:	16K x 8, internal to μC
	RAM:	512 x 4, internal to μC
	EEROM:	128 x 8, ER5911 or ER59C11
Digital Filtering	Software selectable, See Section 7.2	
Digital Inputs	2 inputs, TTL or switch closure, active low, Programmable	

Serial Communication

EDP Port	Full Duplex:	19200, 9600, 4800, 2400, 1200 baud
Printer Port	Simplex:	19200, 9600, 4800, 2400, 1200 baud
Both Ports	Selectable:	EDP (Bidirectional RS232) PRN (RS232 or 20 mA current loop, output only) 8 data bits, no parity 7 data bits, even parity 7 data bits, odd parity

Operator Interface

Display	14 mm (0.55 inch), 14-segment vacuum fluorescent, 7 full digit display. Display update rate adjustable from 250ms to 4 seconds.
Additional Symbols	Tare, Preset Tare, Tare In System, Standstill, Net, Brutto, Center of Zero, Minus Sign, lb, kg, Entry Mode
Color	Blue-green
Keyboard	5-key flat membrane panel. Tactile feel provided by stainless steel domes

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Power

AC Option:

Line Voltages	115 VAC (102-132) and 230 VAC (207-253)
Frequency	50 or 60 Hz
Power Consumption	12 VA maximum
Fusing	115 VAC: 2 x 0.25A SB (UL/CSA) 5x20mm 230 VAC: 2 x T 125 mA (IEC127) 5x20mm

Environmental

OIML	Meets OIML Document No. 11 Climatic, Mechanical, and Electrical requirements
Operating Temperature	–10 to +40°C (legal operating range) –10 to +50°C (industrial operating range)
Storage Temperature	–25 to +70°C
Electric Field Rejection	3V/m for 100 kHz to 1 GHz, ≤ 1 uV susceptibility
Emissions	FCC Part 15 Class A, UL 466, UL 508 and CISPR 22 Class A
Electrical Safety	According to IEC 950, UL 1950, CSA 950

Mechanical

Overall Dimensions	196.9 mm (7.75 in)W x 121.9 mm (4.80 in)H x 129.5 mm (5.10 in)D
Panel Cutout	186.0 mm (7.375 in) W x 114.3 mm (4.50 in) H
Bezel	196.9 mm (7.75 in) W x 121.9 mm (4.80 in) H
Depth Behind Panel	116.8 mm (4.6 in) (Excluding cables)
Weight	2.61 kg (5.75 lb)
Materials	Painted aluminum bezel, painted steel case, and aluminum rear panel
Mounting Options	Adjustable angle wall/bench mount standard Panel mount optional

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7.2 DIGITAL FILTERING

7.2.1 PRINCIPLES OF OPERATION

The IQplus 310A uses an averaging digital filter to reduce the effect of vibration on weight readings. Adjustable threshold and sensitivity functions allow quick settling by temporarily cutting out averaging so the reading immediately jumps to the new value being received.

There are three filtering controls—averaging (DFILT), a cutout threshold (DF THRH), and a cutout sensitivity (DF SENS).

The averaging controls (DFILT 1—DFILT 3) are tunable cascaded stages controlling the effect that a single A/D reading has on the current displayed weight. By default, DFILT 2 and DFILT 3 will acquire the same setting as DFILT 1 unless they are individually set to different values.

- A setting of OFF for all three stages disables all averaging. It produces a 1-in-1 effect, so the current A/D reading is simply the displayed weight (1 x 1 x 1).
- An intermediate setting, for example 8, 8, 8, produces an averaging effect such that each A/D reading has a 1-in-512 effect on the displayed weight (8 x 8 x 8).
- A setting of 256 for all three stages produces the heaviest averaging. At that level, each A/D reading has less than a 1-in-16 million effect on the current displayed weight (256 x 256 x 256).

This averaging function (DFILT 1—DFILT 3) can be used by itself to eliminate the effects of vibration, but heavy digital filter averaging significantly increases the settling time. To overcome this, the DF THRH (Digital Filtering Threshold) and DF SENS (Digital Filtering Sensitivity) controls can be used to temporarily override (cutout) averaging. You specify a threshold (in display divisions) and a sensitivity “n” (in numbers of readings) to set the cutout point.

- If “n” consecutive readings are beyond the threshold, filtering will cutout, or be disabled, until the scale has settled. (Note that because vibration may not allow the scale to go to standstill while filtering is disabled, the settling detection is not the same as motion detection. The scale may still be “in motion” when filtering is re-enabled).

7.2.2 SETTING FILTERING CONTROLS

To set filtering controls, first determine the maximum vibration effects present by running DFILT 1—3 with no filtering (OFF, OFF, OFF) and an empty scale (or displaying a zero net). Watch the display and record the number below which all but a few of the variations fall. Convert this weight reading to display divisions (maximum weight reading divided by your display division size — 1, 2, or 5 — equals total display divisions caused by vibration). You will use this number of display divisions when setting the final cutout threshold (DF THRH). Just record the number for now, leaving the DF THRH set to NONE.

With the DF THRH level set to NONE, adjust the three averaging controls (DFILT 1—3) to eliminate the effects of vibration on the readings. Set these as low as possible. Higher settings will increase the settling time in the vicinity of the target weight.

Next set the filter cutout level (DF THRH) using the value you calculated above.

Next set the cutout sensitivity value (DF SENS) high enough to ignore transient peaks. The longer the duration of the peaks (typically, the lower the vibration frequency), the higher the sensitivity setting should be. Setting this value higher increases the settling time when a weight is added to the scale, as it increases the time before the cutout is engaged.

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7.3 A/D CALIBRATION

This procedure is required following replacement of the A/D Converter (ADC) or the EEPROM. When the ADC and/or EEPROM are replaced, performing this procedure may be necessary in order for the ADC to operate. Implementing this procedure assures that the ADC will operate within its stability specifications. This procedure requires specialized test equipment and cables, and should be performed only by qualified personnel.

7.3.1 REQUIRED EQUIPMENT FOR A/D CALIBRATION

- A Load Cell Simulator with range of 0 to 5.0 mV/V in 0.5 mV/V increments.
- Two test cables wired according to the schematic in Figure 27.
- An RS232 terminal (optional).

7.3.2 A/D CALIBRATION PROCEDURE

(1) Remove (if installed) jumpers JP1 and JP2 from the main circuit board.

(2) Connect the load cell simulator Cable to J3 on the main circuit board. Connect the communications and digital input cable to J4.

(3) Set the Operate/Setup Switch to Setup. Set SW1 to "Normal", SW2 to "Normal" and SW3 to "Calibrate."

(4) If not using an RS232 terminal, follow steps (4)a through (4)d. If using an RS232 terminal, skip to Step (5).

a. Press Gross/Net and Units (Test) keys simultaneously. "A/D N/R" is displayed.

b. A/D Non-Ratiometric Calibration (calibrates the ADC to eliminate internal non-ratiometric errors):

1. Set SW1 to the "Calibrate" position and SW2 to the "Normal" position.

2. Set the Simulator to 0.0 mV/V.

3. Press the Tare Key. "A/D R" is displayed.

c. A/D Ratiometric Calibration (calibrates the ADC to eliminate internal ratiometric errors and to establish the minimum load cell signal):

1. Set SW1 to the "Normal" position and SW2 to the "Reversed" position.

2. Set the Simulator to 0.5 mV/V.

3. Press the Tare key. "A/D G" is displayed.

d. A/D Gain Calibration (standardizes the ADC full-scale range):

1. Set SW1 and SW2 to the "Normal" positions.

2. Set the Simulator to 4.5 mV/V.

3. Press the Tare key. The unit re-initializes and returns to "SETUP".

(5) If using an RS232 terminal, follow steps (5)a through (5)c. If using the keyboard, skip to step (6).

a. A/D Non-Ratiometric Calibration (calibrates the ADC to eliminate internal non-ratiometric errors):

1. Set SW1 to the "Calibrate" position and SW2 to the "Normal" position.

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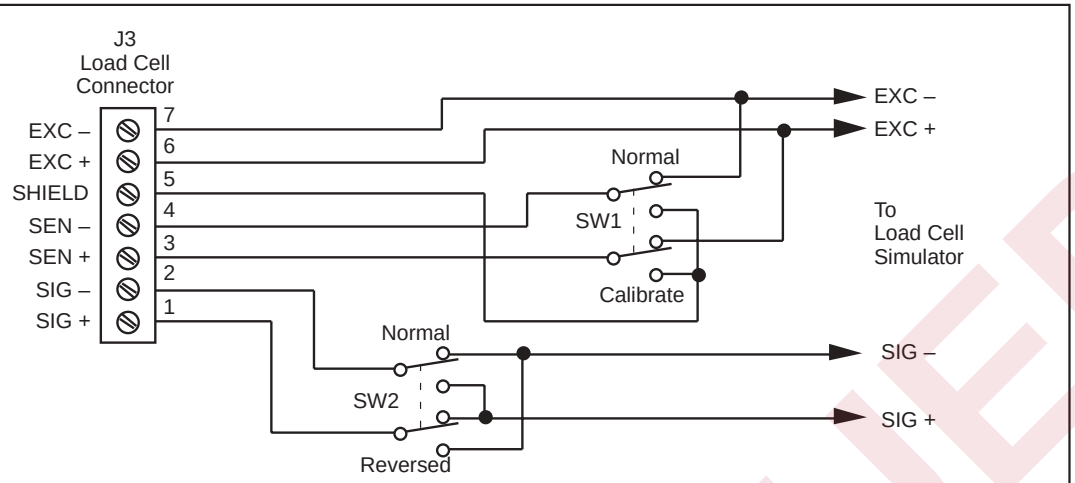
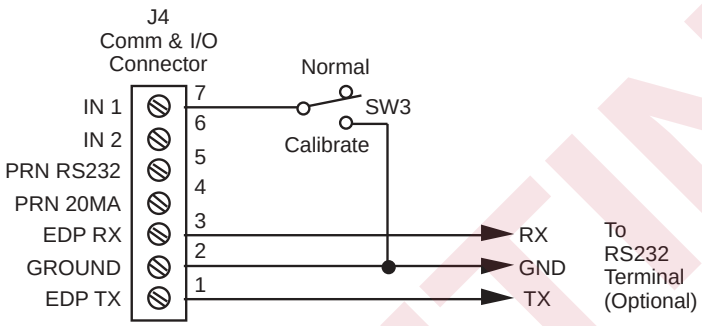
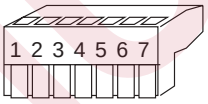


a. Load Cell Simulator Cable



b. Communications and Digital Input Cable



c. 7-Position Screw Terminal Block

FIGURE 27 – A/D CALIBRATION CABLES

2. Set the Simulator to 0.0 mV/V.
3. Send command "CN". Wait for the response "ok".

b. A/D Ratiometric Calibration (calibrates the ADC to eliminate internal ratiometric errors and to establish the minimum load cell signal):

1. Set SW1 to the "Normal" position and SW2 to the "Reversed" position.
2. Set the Simulator to 0.5 mV/V.
3. Send command "CR". Wait for the response "ok".

c. A/D Gain Calibration (standardizes the ADC full-scale range):

1. Set SW1 and SW2 to the "Normal" positions.
2. Set the Simulator to 4.5 mV/V.
3. Send command "CG". Wait for the response "ok".

(6) Set SW3 to the "Normal" position. Using the load cell simulator, calibrate the instrument (See Section 4) and check for normal operation. In “OPERATE” mode, simultaneously press the UNITS key and the hidden key to the left of the ZERO key to display raw counts. Typical readings for the raw counts are 1680 (–0.5 mV/V), 106450 (0.0 mV/V), 943200 (4.0 mV/V), and 1047800 (4.5 mV/V). All readings typically have 10 counts peak-to-peak noise. Press the hiden key by itself to return to the normal display mode.

(7) Re-install jumpers JP1 and JP2 if they were removed in step (1).

DISCONTINUED

7.4 IQ plus 310A LIMITED WARRANTY

Rice Lake Weighing Systems (RLWS) warrants that all RLWS equipment and systems properly installed by a Distributor or Original Equipment Manufacturer (OEM) will operate per written specifications as confirmed by the Distributor/OEM and accepted by RLWS. All systems and components are warranted against defects in materials and workmanship for one (1) year.

RLWS warrants that the equipment sold hereunder will conform to the current written specifications authorized by RLWS. RLWS warrants the equipment against faulty workmanship and defective materials. If any equipment fails to conform to these warranties, RLWS will, at its option, repair or replace such goods returned within the warranty period subject to the following conditions:

- Upon discovery by Buyer of such non-conformity, RLWS will be given prompt written notice with a detailed explanation of the alleged deficiencies.
- Individual electronic components returned to RLWS for warranty purposes must be packaged to prevent electrostatic discharge (ESD) damage in shipment. Packaging requirements are listed in a publication, “Protecting Your Components From Static Damage in Shipment,” available from RLWS Equipment Return Department.
- Examination of such equipment by RLWS confirms that the non-conformity actually exists, and was not caused by accident, misuse, neglect, alteration, improper installation, improper repair or improper testing; RLWS shall be the sole judge of all alleged non-conformities.
- Such equipment has not been modified, altered, or changed by any person other than RLWS or its duly authorized repair agents.
- RLWS will have a reasonable time to repair or replace the defective equipment. Buyer is responsible for shipping charges both ways.
- In no event will RLWS be responsible for travel time or on-location repairs, including assembly or disassembly of equipment, nor will RLWS be liable for the cost of any repairs made by others.

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